



Progress on the Action Plan for Safe Drinking Water in British Columbia

2011



Office of the
Provincial Health Officer

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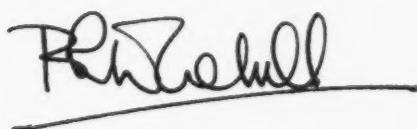
Ministry of Health
Victoria, BC

May, 2012

The Honourable Michael de Jong
Minister of Health

Sir:

I have the honour of submitting the Provincial Health Officer's report, *Progress on the Action Plan for Safe Drinking Water in British Columbia*, for the years 2007/2008 and 2008/2009.

A handwritten signature in black ink, appearing to read "P.R.W. Kendall". It is written in a cursive style with a horizontal line underneath it.

P.R.W. Kendall,
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Provincial Health Officer





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Highlights

This report charts progress made on each of the eight key principles in the provincial government's Action Plan for Safe Drinking Water in British Columbia, developed in 2002. It also reports on activities under the *Drinking Water Protection Act* in accordance with the reporting requirements of Section 4.1 of the Act.

The report covers programs and initiatives during the 2007/2008 and 2008/2009 fiscal years. It follows a similar format to previous reports which covered 2003/2004 through 2006/2007 fiscal years. These reports, which provide background information not covered in this version, can be found online at www.health.gov.bc.ca/pho/reports/drinkingwater.html.

Most British Columbians live in urban centres and receive high quality drinking water from a few large drinking water suppliers. However, there are approximately 4,550 public drinking water systems in the province, the vast majority of which serve very small numbers of people. Water suppliers serving the larger urban areas, as well as some of the smaller centres, are staffed by professional engineers and certified operators who are well qualified to provide the public with the highest quality water possible. When water quality concerns do arise, these suppliers have systems in place to notify their consumers and to correct any problems.

Some water suppliers serve high quality groundwater that requires no initial treatment to make it safe to drink, only requiring a residual disinfectant to maintain water quality in the distribution system. However, water from some wells or from any surface water source must be treated. Treatment may include filtration and then disinfection, or just disinfection using chlorine, chloramines, ultraviolet irradiation or ozonation. Drinking water officers work with water suppliers to ensure drinking water is adequately treated or that plans are in place to improve water treatment, where necessary.

British Columbians who live in small communities or in remote areas are generally the ones who face challenges with their water supplies. For these suppliers, challenges can include:

- Inadequate treatment.
- Trouble attracting and retaining trained and certified operators.
- Difficulty in accessing laboratory services in a timely manner for testing water samples for *E. coli* and total coliform bacteria.
- Lack of financial resources for making improvements to infrastructure.

As described throughout this report, progress is being made to address all of these challenges, though in some cases this progress is slow.

The Action Plan for Safe Drinking Water in British Columbia follows eight principles:

1. The safety of drinking water is a public health issue.
2. Source water protection is a critical part of drinking water protection.
3. Providing safe drinking water requires an integrated approach across all the ministries and agencies that have legislated authority for water protection from source to tap.
4. All water systems need to be thoroughly assessed to determine risks.
5. Proper treatment and water distribution system integrity are important to protect public health.
6. Tap water must meet acceptable safety standards and be monitored.
7. Small systems require a flexible system with safeguards.
8. Safe drinking water should be affordable, with users paying appropriate costs.

Each of these eight principles is discussed in its own numbered section in the report. The remainder of this section highlights activities under the Action Plan for Safe Drinking Water in British Columbia from 2007 to 2009.

One new laboratory received approval from the Provincial Health Officer to test the bacteriological quality of drinking water samples. This new laboratory, located on Salt Spring Island, provides local water suppliers a better chance of getting their water samples to an approved laboratory within the required 30 hours of sample collection. Two Provincial laboratories in Alberta discontinued participation in the approval program, but were not providing service in British Columbia. As part of the effort to continuously improve laboratory services in the province, the Enhanced Water Quality Assurance Program conducted and reviewed 18 laboratory audits and improved auditing tools.

No outbreaks of waterborne disease were reported; water suppliers did issue water quality advisories and boil water notices for approximately 13 per cent of water supply systems around the province due to concerns about inadequate

treatment or operation. The majority of the systems that were on long-term notification were small and are estimated to serve less than 1 per cent of the province's population. Periodic short-term advisories were issued for larger water supply systems at times when water quality deteriorated to the point where water treatment was not reliable.

While water suppliers generally do a good job of notifying the public of water quality concerns, data collection and reporting at a regional and provincial level continues to be inadequate. Efforts to resolve these inadequacies through the drinking water information initiative and the BC-Yukon public health information project, failed to produce a useful product. Health authorities did make improvements to their information management systems over the reporting period and availability of data is somewhat improved over previous years.

During the reporting period, changes were made to legislation and regulations that have an impact on source waters. For instance, regulations under the *Environmental Management Act* were introduced or updated and include measures that will serve to protect drinking water. The Code of Practice for the Slaughter and Poultry Processing Industries came into effect in June 2007 and provides for the regulation of discharge of waste water from slaughter facilities. Similarly, the Code of Practice for the Concrete and Concrete Products Industry which came into effect March 1, 2008, prohibits process water and establishment runoff to pollute any groundwater.

The Ministry of Environment continued to develop water quality guidelines for specific water quality variables such as heavy metals and organic compounds in source water (based on the designated water use), and established water quality objectives to protect the most sensitive water use at a specific location. Water quality guidelines are available at www.env.gov.bc.ca/wat/wq/wq_guidelines.html. Water quality objectives for specific water bodies are available at www.env.gov.bc.ca/wat/wq/wq_objectives.html.

The provincial government worked with the Township of Langley to make sure its Water Management Plan (the first of its kind in the province) ensures a safe and sustainable supply of groundwater to the community. The Plan was submitted to the provincial government but was not approved during the reporting period.

Progress in the area of designation of community watersheds, reported in *Progress on the Action Plan for Safe Drinking Water in British Columbia 2008*, faltered over the current reporting period. The Ministry of Environment continues to designate community watersheds under the *Forest and Range Practices Act*. Only one new community watershed was designated during the reporting period. Information on community watersheds is available at www.env.gov.bc.ca/wsd/data_searches/comm_watersheds/index.html.

The Forest and Range Evaluation Program is working to determine whether licensees are meeting government objectives. In the area of water quality, these objectives deal with stream bank erosion, landslides and livestock concerns. During the reporting period, forestry staff completed approximately 2,180 evaluations.

Regional drinking water teams were formed in all regional health authorities under a Memorandum of Understanding (MOU) on Inter-Agency Accountability and Coordination on Drinking Water Protection, to help ensure coordination of drinking water-related activities across all provincial ministries.

A high-level Water Action Plan for BC was finalized. The provincial government has made a high-level commitment to "Lead the world in sustainable environmental management, with the best air and water quality, and the best fisheries management, bar none." To meet this goal with respect to water quality, the Ministry of Environment has taken a lead role in developing a cross-government strategy to address water quality and quantity issues in a coordinated manner. The plan, *Living Water Smart*, is available at www.livingwatersmart.ca/book/.

During the reporting period, the Ministry of Community and Rural Development provided 101 grants to communities to help them plan for improvements to their drinking water systems.

More than 4,800 water systems inspections were conducted during the reporting period, and 4,048 of the province's 4,550 water supply systems had current hazard ratings by March 31, 2009. Data collection and reporting remains inconsistent and incomplete; however, by the end of the reporting period, there were only 502 systems without a hazard rating, down from 1,091 at the beginning of the reporting period.

Significant progress has been made in ensuring that water systems have valid operating permits, with an increase in permitted systems of over 1,000 to a total of 4,539 permitted systems in March 2009. Moreover, the number of systems with conditions on their operating permits increased by more than 400 to 1,195 in March 2009. Similarly, the number of systems with an emergency response plan increased from under 1,500 in 2007 to over 2,500 in 2009. To a certain extent these improvements reflect improved data collection rather than improvements to system operation, but the changes are encouraging.

Available data for 2007 documented 900 drinking water systems in the province disinfecting their water, with just over 400 of these systems also providing filtration. With improved data availability, particularly from the Interior Health Authority, and treatment improvements, these numbers had increased to 1,810 systems disinfecting and 519 filtering by March 31, 2008. By March 31, 2009, these numbers had increased to 1,968 systems disinfecting their water and 675 providing filtration. By March 31, 2009, approximately 360,000 people in British Columbia were receiving filtered water. There are over 3 million people who continue to receive unfiltered surface water;¹ however, many of the unfiltered systems can be adequately treated with a combination of ultraviolet disinfection and chlorination, as is the case with over 300,000 people served by the Capital Regional District Integrated Water Services.

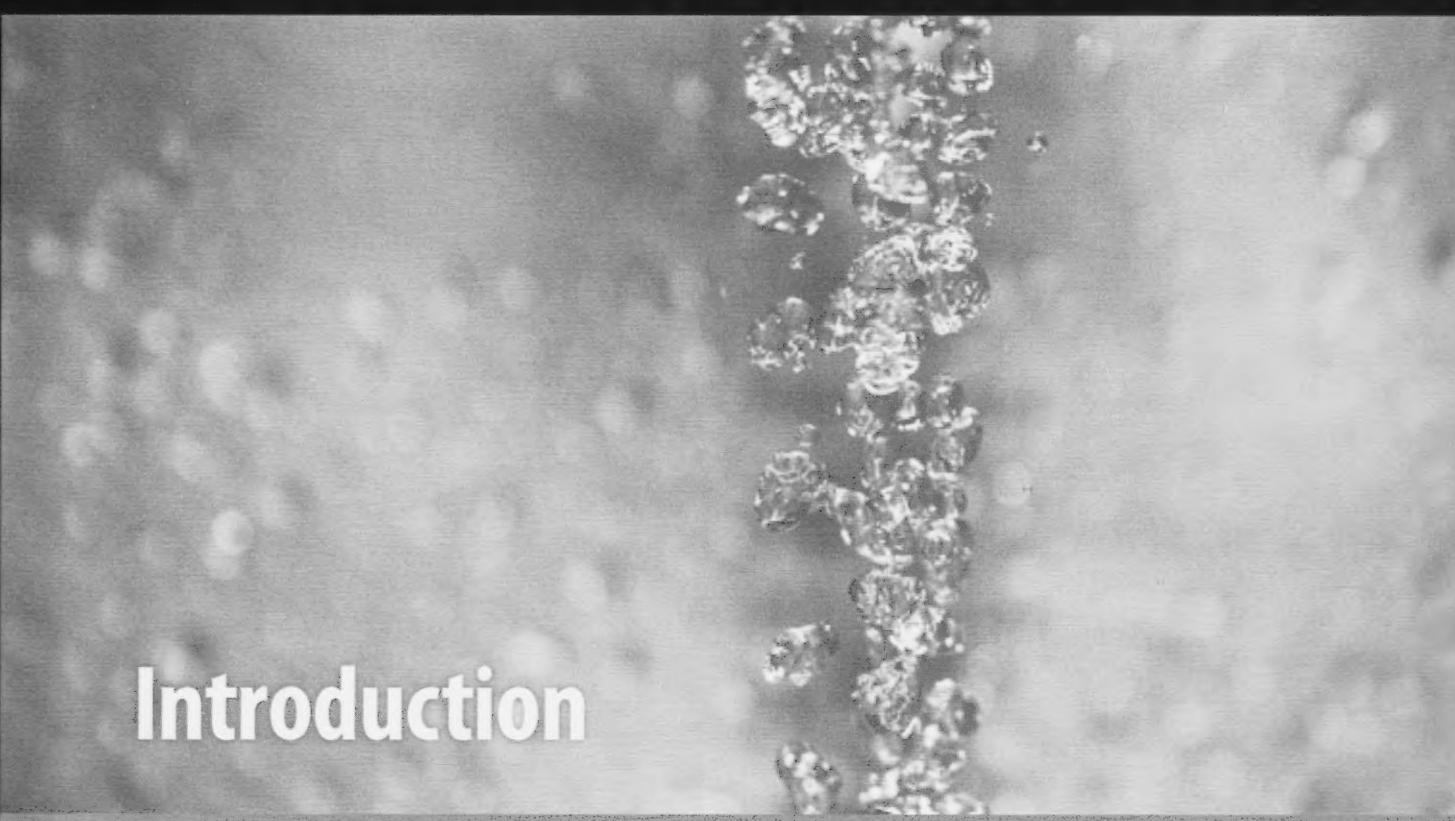
Over the reporting period, the combined Towns for Tomorrow and Building Canada Fund committed over \$100 million towards \$153 million worth of drinking water-related infrastructure improvements and over \$925,000 toward planning for water supply improvements.

In excess of 100,000 microbiological tests were conducted on BC water supplies each year, and during the reporting period at least 1,121 samples were tested for a range of chemicals such as metals, nitrates, fluoride and disinfection by-products such as trihalomethanes.

The Province requires all local governments in British Columbia to comply with generally accepted accounting

¹ Metro Vancouver subsequently commissioned their new Seymour Capilano filtration plant and have been providing a mix of both filtered and unfiltered water since December 2009.

principles set out by a Public Sector Accounting Board. As of January 2009, the Canadian Institute of Chartered Accountants requires local governments to undertake an inventory of all of their assets, including their drinking water infrastructure (when it was installed, its useful life and original cost). This requirement will result in improved assessments of treatment and distribution works and will facilitate planning for future maintenance and replacement schedules.



Introduction

This report charts progress made on each of the eight key principles in the Action Plan for Safe Drinking Water in British Columbia, developed in 2002 by the provincial government. It also reports on activities under the *Drinking Water Protection Act* in accordance with the reporting requirements of Section 4.1 of the Act. This report covers programs and initiatives during the 2007/2008 and 2008/2009 fiscal years. It follows a similar format to previous reports, which covered 2003/2004 through 2006/2007 fiscal years. These reports can be found online at www.health.gov.bc.ca/pho/reports/drinkingwater.html. The three reports may be read in conjunction, as the first two provide a great deal of contextual information not repeated in the current report.

For more information on the Action Plan for Safe Drinking Water in British Columbia, see the introduction to the 2007 report or download the Action Plan from the Government of British Columbia website at: www.health.gov.bc.ca/cpa/publications/safe_drinking_printcopy.pdf.

Drinking Water in British Columbia

The *Drinking Water Protection Act* applies to all water systems in the province that serve more than one connection. While the province is home to approximately 4,500 drinking water systems (see Figure 1), the vast majority of these systems serve very few people.

Most British Columbians live in urban centres and receive high quality drinking water from a few large drinking water suppliers. Water suppliers serving these larger urban areas, as well as some of the smaller centres, are staffed by professionals including professional engineers and certified operators who are well qualified to provide the public with the highest quality water possible. When water quality concerns do arise, these suppliers have systems in place to notify their consumers and to correct any problems.

The *Drinking Water Protection Act* and regulation recognize that drinking water supplies are best protected using a multi-barrier approach, from source to tap. Protection is achieved through a multi-step process that gathers information about each water supply system through inspections, assessments and water monitoring, and then puts barriers in place to stop potential contaminants from entering the drinking water supply.

Some water suppliers serve high quality groundwater that requires no treatment to make it safe to drink. However, water from some wells or from any surface water source must be treated. Treatment may include filtration and then disinfection, or just disinfection using chlorine, chloramines, ultraviolet irradiation or ozonation. Drinking water officers work with water suppliers to ensure drinking water is adequately treated or that plans are in place to improve water treatment, where necessary.

Figure 1 shows the breakdown of the 4,550 water systems in British Columbia by health authority. There are an additional 357 drinking water systems serving First Nations communities on reserve. The total number of systems changes as new systems are created, as existing unregulated systems are located by drinking water officers and as others are amalgamated or stop serving the public when the business they are associated with closes (such as a restaurant or a campground). Some data presented in this report were compiled at different times of the year and may show a different total number of systems.

Of the 4,550 systems on record in March 2009, only 225 serve more than 300 connections (connections refers to service connections to homes, apartment buildings businesses, parks, etc.), 997 serve between 15 and 300 connections and 3,328 serve fewer than 15 connections.

British Columbians who live in small communities or in remote areas are generally the ones who face the greatest challenges with their water supplies. For these suppliers, challenges can include:

- Inadequate treatment.
- Trouble attracting and retaining trained and certified operators.
- Difficulty in accessing laboratory services in a timely manner for testing water samples for *E. coli* and total coliform bacteria.
- Lack of funding support for making improvements to infrastructure.

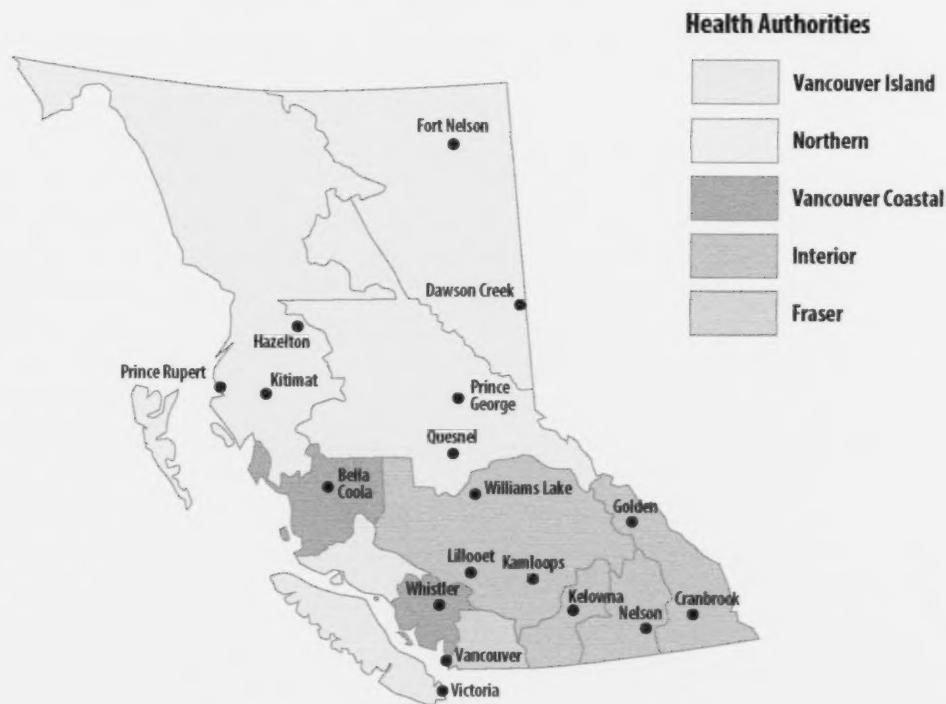
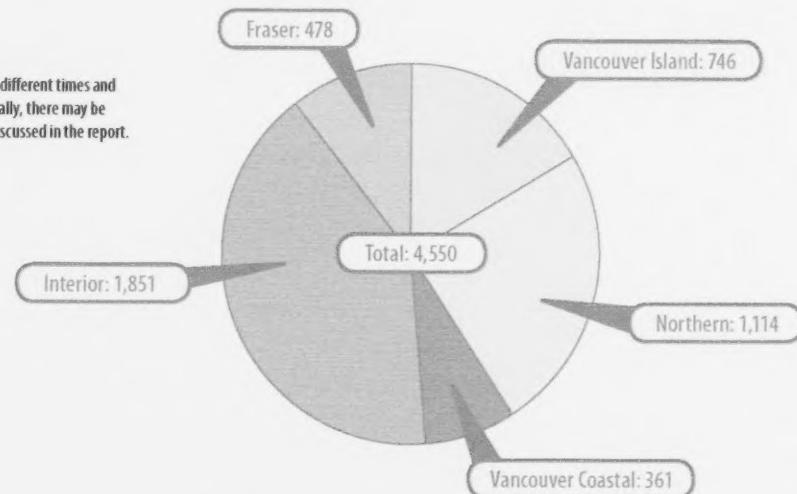
As described throughout this report, progress is being made to address all of these challenges, though in some cases this progress is slow.

Province-wide, information management and reporting is a major ongoing challenge. Water suppliers collect data about their water supplies through their monitoring and testing programs, and this information is shared with drinking water officers from the regional health authority. Each health authority has databases where this information, and other data they collect, is stored, although not all data provided by water suppliers is entered into health authority databases. Provincial government ministries and agencies also collect information about water in the province, whether it relates to land use (urban development, forestry, agriculture, mining or other industrial activities) or environmental monitoring. These data are again stored in various databases. Ideally, the information in all of these databases would be shared for the benefit of all parties. Such sharing would also make it much easier to chart progress in achieving the objectives of the Action Plan for Safe Drinking Water in British Columbia and the *Drinking Water Protection Act* and Regulation. Initiatives to resolve data management challenges have not yet met with success. These data management initiatives are described in more detail in Section 3.

Figure 1: Number of recorded drinking water systems in the province, by health authority, as of March 31, 2009

Note: Given that data in the report was compiled at different times and that the number of water systems changes periodically, there may be slight variations in the numbers of water systems discussed in the report.

Source: Health Authorities



Accountability

The 2007 report *Progress on the Action Plan for Safe Drinking Water in British Columbia*, which covered the fiscal years 2003/2004 and 2004/2005, set out and followed an accountability framework that would allow the Provincial Health Officer to chart progress on drinking water issues in the province over many years. This framework was based on one developed by the Auditor General of British Columbia and is used again for this report. Figure 2 shows this basic framework.

For the purpose of reporting on progress on the Action Plan for Safe Drinking Water in British Columbia, the eight principles identified in the Action Plan serve as the objectives in both the previous reports and this one:

1. The safety of drinking water is a public health issue.
2. Source water protection is a critical part of drinking water protection.
3. Providing safe drinking water requires an integrated approach across all the ministries and agencies that have legislated authority for water protection from source to tap.
4. All water systems need to be thoroughly assessed to determine risks.

5. Proper treatment and water distribution system integrity are important to protect public health.
6. Tap water must meet acceptable safety standards and be monitored.
7. Small systems require a flexible system with safeguards.
8. Safe drinking water should be affordable, with users paying appropriate costs.

For ease of reporting and reading, each of these eight principles is discussed in its own numbered section in this report. For each objective, progress is detailed under the headers of effective strategies, aligned management systems, and performance measurement and reporting. These categories cover the following types of topics:

- **Effective strategies:** Legislative and regulatory changes, policies, political priorities.
- **Aligned management systems:** Budgets, information systems, human resources, administration and financial controls.
- **Performance measurement and reporting:** Performance measurement, program evaluation, public accounts, annual reports, reports from various sectors (government agencies, industry, non-profit organizations, etc).

Figure 2: Accountability framework





Section 1. Public Health Protection

Access to clean, safe and reliable sources of drinking water remains a basic tenet of public health protection. In British Columbia, the Ministry of Health is the lead provincial ministry responsible for drinking water. It works closely with other government ministries, the health authorities and water supply organizations to make sure public health is protected from threats to drinking water.

Most drinking water officer positions in the health authorities remained filled during the reporting period, with minor exceptions resulting from staff turnover.

Between April 1, 2007, and March 31, 2009, one new laboratory received approval from the Provincial Health Officer to test the bacteriological quality of drinking water samples. This new laboratory, located on Salt Spring Island, provides local water suppliers a better chance of getting their water samples to an approved laboratory within the required 30 hours of sample collection. Two Provincial laboratories in Alberta discontinued participation in the approval program, but were not providing service in British Columbia. As part of the effort to continuously improve laboratory services in the province, the Enhanced Water Quality Assurance Program conducted and reviewed 18 laboratory audits and improved auditing tools.

While no outbreaks of waterborne disease were reported, water suppliers did issue water quality advisories and boil water notices for approximately 13 per cent of water supply systems around the province due to concerns about inadequate treatment or operation. The majority of these water systems were small and are estimated to serve less than 1 per cent of the province's population.

While water suppliers generally do a good job of notifying the public of water quality concerns, data collection and reporting at a regional and provincial level continues to be inadequate. Efforts to resolve these inadequacies through the drinking water information initiative and the BC-Yukon public health information project failed to produce a useful product. Health authorities did make improvements to their information management systems over the reporting period, and available data is somewhat improved over previous years.

1.1 Effective Strategies

During the reporting period (fiscal years 2007/2008 and 2008/2009), two minor regulatory amendments were made to the Drinking Water Protection Regulation to streamline the general regulatory framework. In 2007, provisions of the Health Act Fees Regulation related to operating permits for water systems were transferred to the Drinking Water Protection Regulation, to improve clarity about operating permit fees. In 2008, water systems that serve members of a strata corporation, and receive water from a water supply system, were excluded from the definition of a domestic water system. This amendment removes an unintended regulatory burden from strata corporations and drinking water officers.

Drinking water officers are empowered to issue violation tickets under the Violation Ticket Administration and Fines Regulation under the *Offence Act* for failure to comply with certain sections of the *Drinking Water Protection Act* and Regulation. The Regulation can be found online at www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/89_97_03. The Provincial Fines Booklet (www.pssg.gov.bc.ca/police_services/publications/docs/provincial-fines-booklet.pdf) includes the complete list of ticketable offences under both the *Drinking Water Protection Act* and the *Public Health Act*.

Health authority data systems did not track information related to violation tickets during the reporting period. Health authorities had no record of tickets having been issued in 2007/2008, although Interior Health Authority did qualify their response to the effect that their data management system does not track tickets. In 2008/2009, one ticket was reported as having been prepared, but as of March 31, 2009, it had not been issued pending compliance with an order to conduct an assessment. Contrary to health authority data, the Insurance Corporation of British Columbia, which has administrative responsibilities for all tickets issued under the Violation Ticket Administration and Fines Regulation, indicates that four tickets were issued for failure to comply with the *Drinking Water Protection Act* in 2008 and three tickets were issued in 2009. Only two of these tickets had been paid by May 31, 2010, and since there is no mechanism in place to follow through on ensuring that tickets are paid, the deterrent value of ticketing is limited.

Guidelines, Directives, Special Committees and Reports

On March 23, 2006, the Minister of Health issued an order under Section 4 of the *Drinking Water Protection Act* that made the *Drinking Water Officers' Guide* a guideline that must be considered by drinking water officers in carrying out their duties. Minor revisions were made to this guide effective April 2007. The *Drinking Water Officers' Guide* can be found at www.health.gov.bc.ca/protect/dwoguide_updated_approved%202007.pdf.

The Minister established a special drinking water advisory committee in 2007 to report on the significance of turbidity and microbial risk in drinking water. A report of the committee was submitted on February 28, 2008, and is available at www.health.gov.bc.ca/protect/dwcommittee.html. The Ministry of Health has been working with health authorities to ensure guidance on responding to turbidity concerns considers the advice of the committee.

In early 2009, the Provincial Health Officer released the second report on progress on the Action Plan for Safe Drinking Water in British Columbia, covering the period 2005/2006 and 2006/2007. It can be downloaded from the Provincial Health Officer website at www.health.gov.bc.ca/pho/reports/drinkingwater.html.

Office of the Ombudsperson's Special Report

In June 2008, the Ombudsman released Special Report No. 32 — *Fit to Drink: Challenges in Providing Safe Drinking Water in British Columbia*. This report, available at www.ombudsman.bc.ca/resources-and-publications, provides the results of the Ombudsman's investigation into concerns and complaints related to the *Drinking Water Protection Act*. It includes 34 recommendations for improving administration of the *Drinking Water Protection Act* and enhancing overall accountability of drinking water officers and other government officials.

The Ministry of Healthy Living and Sport, Ministry of Environment and health authorities have responded to all of the recommendations in the report. They have published information for the general public and other affected parties clarifying the procedure for making complaints, improved procedures to track complaints, standardized procedures for drinking water officers to follow when responding to drinking

water turbidity events, and clarified the procedures for drinking water officers to undertake investigations requested under Section 29 of the *Drinking Water Protection Act*. In addition, at the end of the reporting period, they were revising and enhancing procedures to notify people with compromised immune systems about risks associated with drinking water. Further detail on how the Ombudsman's recommendations have been addressed is available at www.ombudsman.bc.ca/images/resources/reports/2009.12.07_Update_on_DW_recommendations.pdf.

Drinking Water Officer Positions in the Regional Health Authorities

As described in the previous report, each regional health authority has hired designated drinking water officers and/or has delegated drinking water officer responsibilities to various staff. The number of drinking water officers, delegates and support staff varies between the health authorities, based on the number of water supply systems in the region, as does the organizational structure within which they operate.

The responsibility for administering the *Drinking Water Protection Act* often forms only one part of a designated person's duties, with the rest of their duties defined by other provincial or federal legislation such as the *Health Act*, *Food Safety Act*, *Tobacco Control Act*, and *Tobacco Act*. Table 1

summarizes the number of full-time equivalent (FTE) staff positions dedicated to regional drinking water programs. The 65.60 total FTEs reported as of March 31, 2009, is a decrease of 16.60 staff from the number reported in 2006/2007. This difference reflects a combination of staff reductions, changes in how FTEs are reported and changes in the approach to administration of the drinking water programs (e.g., in Interior Health Authority there was a shift to four dedicated drinking water staff and less part-time involvement by field public health inspectors). While the reduction in reported FTEs has not prevented progress in program delivery, as evidenced by the overall progress reported in this document, it is clear that significant challenges remain and staffing levels must be maintained or increased.

1.2 Aligned Management Systems

Drinking Water Officer Training and Support

Over the course of the reporting period drinking water officers engaged in continuing education through conferences and workshops and taking courses available through universities. Detailed data on training attended by drinking water officers is not available. No dedicated workshops for drinking water officers were held during the reporting period, as had been done in previous years.

Table 1: Number of full-time equivalent (FTE) staff working as, or supporting, drinking water officers, as of March 31, 2009

Health Authority	FTEs by type of position						
	Medical Health Officers	Public Health Inspectors	Management	Technical*	Public Health Engineers	Clerical	Total
Vancouver Island	0.50	4.60	0.95	2.90	1.50	2.30	12.75
Northern	0.40	5.00	0.30	0.30	0.70	1.00	7.70
Vancouver Coastal	0.25	3.50	0.25	0.50	1.50	0.50	6.50
Interior	0.50	7.50	2.70	7.00	3.50	5.00	26.20
Fraser	0.40	6.00	1.20	2.45	1.00	1.40	12.45
Total	2.05	26.60	5.40	13.15	8.20	10.20	65.60

*Includes technical specialists and water samplers

Source: Health Authorities

1.3 Performance Measurement and Reporting

Waterborne Disease

The Health Act Communicable Disease Regulation requires physicians and laboratories to report all known or suspected cases of waterborne illness to the regional medical health officer. Health authority staff may follow up on individual cases through direct contact with the patient, in order to request information on what activities the patient had recently engaged in that may have resulted in the illness. Information collected relates to types of food and water consumed, contact with animals or other ill people, travel out of the country, etc. The medical health officer in turn reports information on all cases to the British Columbia Centre for Disease Control (BCCDC), where they are entered into a data management system. The BCCDC reviews the data to identify any clusters of illness that may indicate the occurrence of an outbreak, and also reports on trends in illness over time.

No outbreaks of waterborne disease were identified and reported between April 2007 and March 2009. However, individual British Columbians were affected by enteric or gastro-intestinal diseases from pathogens such as *Campylobacter*, shigatoxigenic *E. coli*, *Cryptosporidium*, *Giardia*, and *Salmonella*.

Campylobacteriosis

Research estimates that between 75 and 80 per cent of cases of campylobacteriosis are foodborne, though infection can be transmitted by waterborne *Campylobacter* if the water is contaminated with fecal material and not adequately treated.

Campylobacteriosis remains the most commonly reported enteric disease in British Columbia, with a total of 1,639 cases in 2007 and 1,635 cases in 2008. The number of reported cases in 2007 and 2008 is similar to the numbers reported in 2005 and 2006, and remains higher than the national incidence. A downward trend that began after 1998 stabilized in 2004.

In 2008, the highest rates were reported in Vancouver Coastal, Vancouver Island and Fraser Health Authorities. The highest rate was identified in the North Shore/Coast Garibaldi Health Service Delivery Area (HSDA) of Vancouver Coastal Health Authority (61.6 per 100,000 population). An increase in rates compared to 2007 was observed in Central and North Vancouver Island and Northeast HSDAs.

Details on the background of waterborne disease in British Columbia are reported in previous reports on progress on the Action Plan for Safe Drinking Water in British Columbia. The data provided in this section are for all reported cases during 2007 and 2008 and do not differentiate between cases acquired from drinking water and cases acquired through other routes of exposure.

Table 2 shows the number of cases of selected enteric diseases reported in BC in the 2007 and 2008 calendar years.

Table 2: Cases of enteric diseases reported in BC, 2007 and 2008

Enteric disease	2007	2008
Campylobacteriosis	1639	1635
Giardiasis	649	632
Cryptosporidiosis	88	115
Shigatoxigenic <i>E. coli</i> infections	183	114
Salmonellosis	792	922
Total	3,351	3,418

Source: BCCDC

Figures 3 through 7 show the rates of these enteric diseases between 2000 and 2009.

Cryptosporidiosis

Rates of cryptosporidiosis in BC have declined by approximately 50 per cent since 2000. In 2008, Fraser East had relatively low rates at 1.4 per 100,000, while the highest rates occurred in Vancouver, followed by Northwest and Fraser South. Infections were most common in males under 5 years of age. Infection with *Cryptosporidium parvum* displays a seasonal pattern, with a peak in the late summer and early fall. Cryptosporidiosis has been linked to waterborne outbreaks throughout North America, including three identified in British Columbia since 1996. The background incidence associated with drinking water on an on-going basis is not known. Since *Cryptosporidium* is resistant to disinfection by chlorine alone, there are concerns that some of the background cases in British Columbia may be linked to water supplies that are not filtered or treated with ultraviolet irradiation, which is more effective at protecting consumers from infection. No outbreaks were reported in 2007 or 2008.

Figure 3: Campylobacteriosis rates by year,
2000 – 2009

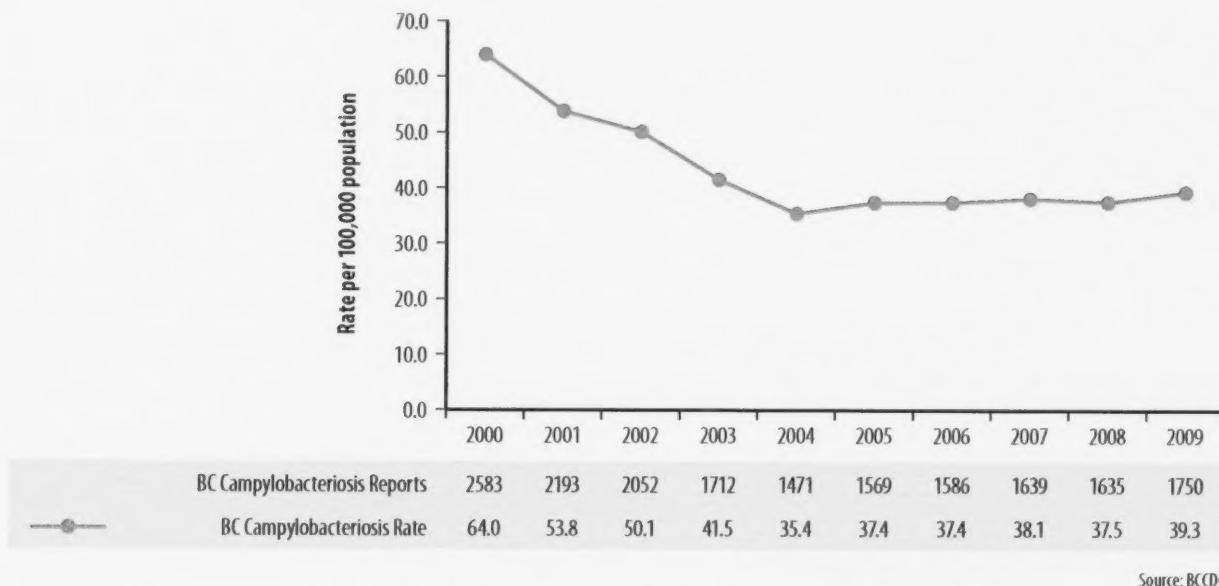
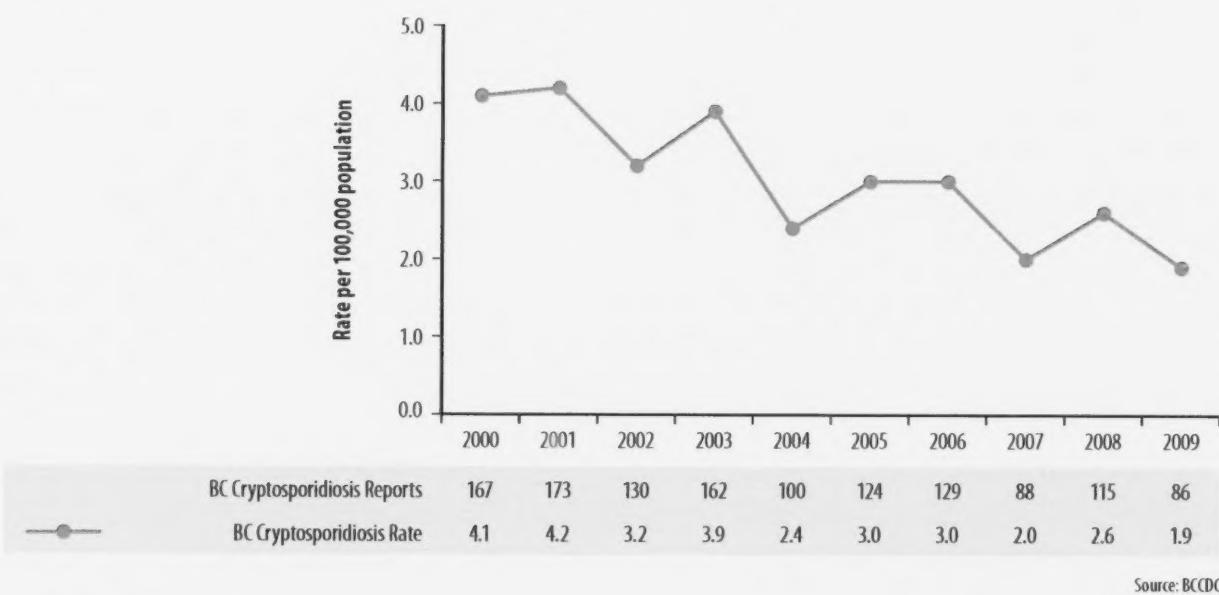


Figure 4: Cryptosporidiosis rates by year,
2000 – 2009



Shigatoxigenic *E. coli*

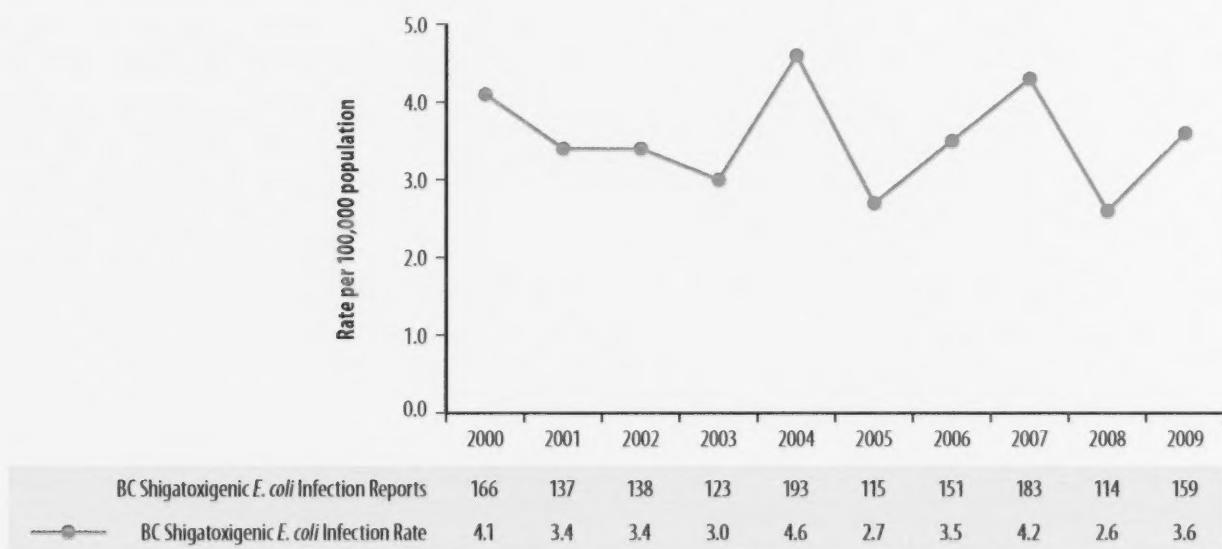
Reporting of shigatoxigenic *E. coli* infection increased slightly in 2007 compared to 2006, with a total of 183 cases (4.2 cases per 100,000 population), but decreased to 2005 levels in 2008. The highest regional rates were reported in South and Central Vancouver Island and Fraser East, with rates from 3.9 to 45 cases per 100,000.

Protocols exist to ensure that all reported cases of shigatoxigenic *E. coli* infection are followed up in BC through direct contact with each case. Research shows that 65 to 85 per cent of cases are foodborne. The rest could either be spread through person-to-person contact or by contaminated water. It is unknown how many of the 183 cases noted earlier could have been waterborne, although there were no known outbreaks of waterborne *E. coli* infection during the reporting period.

Giardiasis

Annual rates of giardiasis in BC have decreased over the last decade. In 2008 and 2009, incidence was lower than usual with no seasonal peak and no outbreaks detected. Vancouver and Fraser South experienced the highest rates of infection at 24.2 and 19.4 per 100,000 population, respectively.

Figure 5: Shigatoxigenic *E. coli* infection rates by year, 2000 – 2009



The most common route of transmission of *Giardia* is person-to-person contact, particularly between children. Contaminated drinking water, recreational water and, to a lesser extent, food have been associated with outbreaks, although no outbreaks were reported in either 2007 or 2008 in BC. Contact with animals has also been implicated as a source of human giardiasis.

The downward trend may be due to initiatives aimed at improving food safety, traveler safety or drinking water safety in BC.

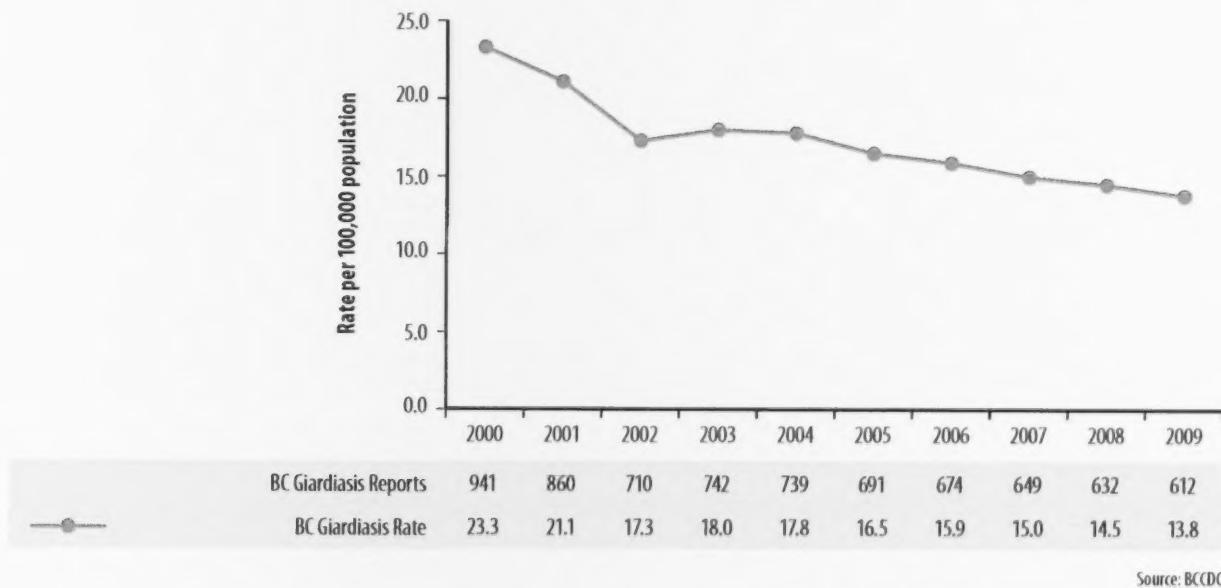
Salmonellosis, Typhoid Fever and Paratyphoid Fever

In 2007 and 2008, 792 and 922 cases of *Salmonella* infection were reported respectively, for a 2008 rate of 20.8 per 100,000. The rate of Salmonellosis has been increasing in BC since 2007, due to an ongoing *S. Enteritidis* outbreak associated with poultry products, most likely eggs. Rates were highest in children under 5 years of age and similar overall in males and females. Rates were highest in Fraser South, Kootenay Boundary and Vancouver.

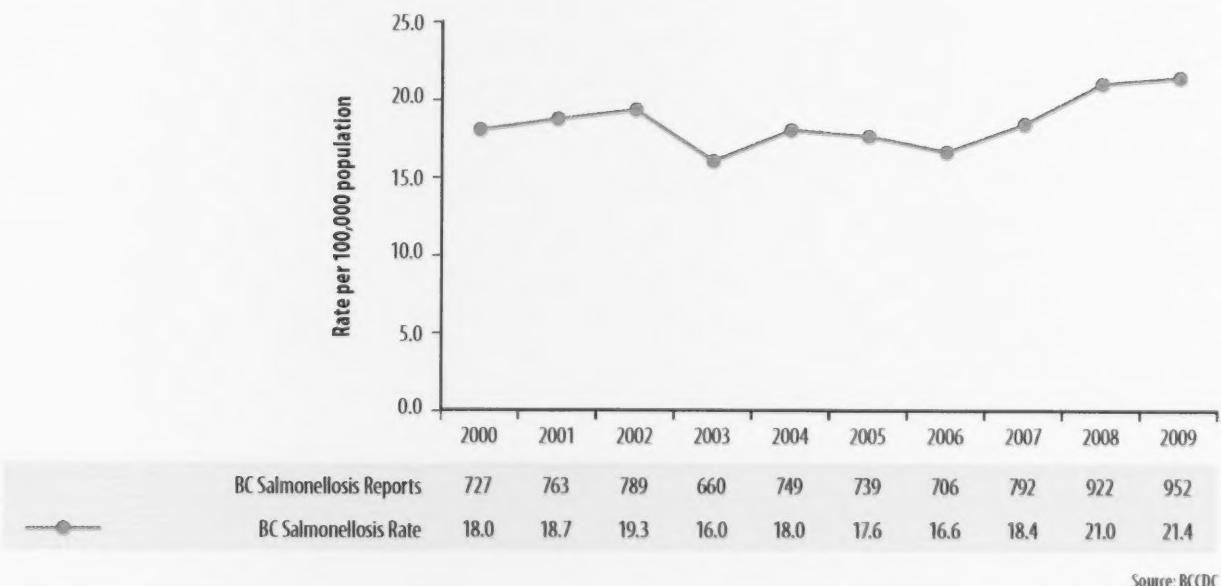
In 2008, 45 cases of *S. Typhi* were reported for a rate of 1.0 per 100,000, almost double the number of cases reported in 2007. Most cases of *S. Typhi* and *S. Paratyphi* were reported from Fraser Health Authority, were clustered in the first quarter of the year and were associated with travel to India.

Source: BCCDC

**Figure 6: Giardiasis rates by year,
2000 – 2009**



**Figure 7: Salmonellosis rates by year,
2000 – 2009**



Public Notification or Advisories Related to Water Quality

Water suppliers are responsible for notifying the public about water quality concerns. Water quality advisories or boil water notices may be issued for a number of reasons, as described in previous reports, including poor water quality, inadequate treatment or disease outbreaks.

After the *Drinking Water Protection Act* was promulgated in May 2003, drinking water officers began re-evaluating programs that encourage public awareness of water quality problems. As public notification procedures have changed, the value of tracking the number of boil water advisories as a way of assessing the overall performance of drinking water programs has become questionable. In particular, the increase in water quality advisories and notices over time should not be seen as a reflection of decreased water quality.

The proportion of systems under advisories does not reflect the proportion of the population affected. Most of the long-term advisories in the province are on small public water supply systems with 1 to 300 connections. These systems are estimated to serve less than 1 per cent of the total population in BC. Care needs to be taken to ensure that the focus on reducing the number of boil water advisories does not undermine the fundamental purpose of an advisory, which is to inform specific communities about concerns related to the quality of their drinking water. Further, one of the primary reasons that the number of advisories and notices increases over time is the discovery of existing, but unpermitted water systems that are not adequately treating their water.

The total number of water supply systems on water quality advisory or notification in March 2008 was 562. In March 2009, this number had increased by 42.

The 2007 report, *Progress on the Action Plan for Safe Drinking Water in British Columbia*, identified 393 boil water advisories or notices in effect in November 2003. By November 2006, the number had increased by 87 to 480. The further increase by March 2009 to 604 should be taken in the context of an increase in the total number of systems regulated by drinking water officers during that time period (from 3,957 in 2003 to 4,550 in 2009). While this means that 13 per cent of systems were on some form of public advisory or notification in March 2009, the population affected remained under 1 per cent of the BC population.

The exact number of people in the province affected by advisories and notifications is not available, since Interior Health Authority does not track this information. The 212 advisories and notifications in effect in the other four health authorities affect a reported population of 22,226, or approximately 0.6 per cent of the population in those regions. For context, in October 1994, one year after the introduction of a now obsolete data management and reporting system, 220 permitted systems were on boil water advisories in British Columbia. At that time, only 2,309 systems were recognized under the Safe Drinking Water Regulations; thus, 0.9 per cent of systems were on advisories that affected an estimated 32,160 people or 0.9 per cent of the population.

A significant portion of the increase in the total number of regulated systems resulted from drinking water officers locating existing, but previously unpermitted, small water systems with inadequate treatment. The people served by these systems have not experienced a decrease in water quality, but are now being formally notified of the risk to their health from drinking their water. While improvements have been made, more can clearly be done to improve water treatment, reduce the need for boil water notification in the province and minimize the need for individuals to boil their water as a *de facto* form of water treatment. The critical aspect to the increased number of advisories and notices is the fact that people who rely on water systems that lack an adequate level of safety have been clearly informed of that fact and are able to take interim measures to protect their health until improvements to their water systems can be made.

While water suppliers generally do a good job of notifying the public of water quality concerns, at a regional and provincial level, data collection and reporting related to public notifications and advisories continues to be inadequate. Health authorities continue to use different data management systems from one region to another, and those systems do not capture all of the data needed to report out on activities under the *Drinking Water Protection Act*. The systems used by the health authorities do allow them to publicly report on their websites,² where they post information related to water

² Websites for the regional health authorities are:

Northern Health Authority: www.healthspace.com/nba

Vancouver Island Health Authority: www.healthspace.com/viba

Fraser Health Authority: www.healthspace.com/fha

Vancouver Coastal Health Authority:

www.vch.ca/your_environment/water_quality/drinking_water/

Interior Health Authority www.interiorhealth.ca/health-and-safety.aspx?id=534

quality advisories, water system inspections and water quality monitoring results, but these systems lack a comprehensive tracking and reporting function.

Laboratory Testing of Drinking Water Samples

Water samples collected for microbiological sampling are time-sensitive; laboratories must begin to analyse them within 30 hours of collection. In most areas of BC, water samples are tested well within this time limit. However, water suppliers in some remote areas (e.g., in the North, in some central coastal regions and in some parts of the Kootenays) may face obstacles in getting samples to the closest laboratory in a timely manner.

Improvements made in previous years in efficient transport of drinking water samples to laboratories continued to be effective over the reporting period, and the number of samples “wasted” because they are too long in transit remains under 1 per cent. One setback in sample transport has been the decision by a laboratory near Fort St. John to stop analyzing drinking water samples, thus requiring samples to be shipped farther away.³

Laboratory Approval and Audits

The laboratories that test drinking water samples for microbiological water quality in BC are approved by the Provincial Health Officer. This process ensures that laboratories are using appropriate testing methods, results are reliable and processes to immediately report positive *E. coli* results are in place. The Enhanced Water Quality Assurance Program (EWQA) reviews applications from laboratories and engages experienced laboratory personnel to undertake inspections of laboratories and identify any concerns they observe about laboratory operations. A steering committee reviews inspection reports and may request a laboratory to make changes to their operations. When satisfied that a laboratory provides reliable service, the steering committee will recommend that the Provincial Health Officer approve the laboratory.

In the 2007 and 2008 calendar year, the EWQA continued to maintain a two-year audit cycle to routinely review laboratories for ongoing approval. Of the 18 laboratories that had been approved at the beginning of 2007, all underwent some level of review, either a full audit or a review of new test methodologies.

Table 3: Laboratories approved by the Provincial Health Officer for water microbiology testing, as of March 31, 2009

Lower Mainland	ALS Environmental, Vancouver BCCDC Environmental Microbiology Laboratory, Vancouver GVRD Water Laboratory, Burnaby IG Micromed Environmental Inc., Richmond Maxxam Analytics, Burnaby Norwest Labs, Surrey	(Total Coliform, Fecal Coliform, <i>E. coli</i>) (Total Coliform, Fecal Coliform, <i>E. coli</i>) (Total Coliform, <i>E. coli</i>) (Total Coliform, Fecal Coliform, <i>E. coli</i>) (Total Coliform, Fecal Coliform, <i>E. coli</i>) (Total Coliform, Fecal Coliform, <i>E. coli</i>)
Vancouver Island	Agrichem Analytical, Salt Spring Island Maxxam Analytics., Victoria CRD Water Laboratory, Victoria MB Laboratories Ltd., Sidney North Island Laboratories, Courtenay	(Total Coliform, <i>E. coli</i>) (Total Coliform, Fecal Coliform, <i>E. coli</i>) (Total Coliform, <i>E. coli</i>) (Total Coliform, Fecal Coliform, <i>E. coli</i>) (Total Coliform, Fecal Coliform, <i>E. coli</i>)
Mid-Coast	Northern Laboratories Ltd., Prince Rupert	(Total Coliform, Fecal Coliform, <i>E. coli</i>)
Interior	Caro Environmental Services, Kelowna Eco Tech Laboratory Ltd., Kamloops	(Total Coliform, Fecal Coliform, <i>E. coli</i>) (Total Coliform, Fecal Coliform, <i>E. coli</i>)
North	ALS Environmental, Grandhaven	(Total Coliform, <i>E. coli</i>)
Alberta	ALS Environmental, Calgary	(Total Coliform, <i>E. coli</i>)

A current list of approved laboratories can be found online at www.phsa.ca/NR/rdonlyres/5B077C99-9015-42AC-943F-32F74E9968B6/0/831PHOApprovedLaboratoryList20100401.pdf.

³ Subsequent to the reporting period this laboratory has resumed providing drinking water sample analysis.

In addition to the laboratory near Fort St. John, two Alberta Provincial Laboratories chose to discontinue participation in the EWQA. The Alberta laboratories were not providing service to water suppliers in British Columbia, and removal of their approval does not adversely affect laboratory services. A small laboratory on Salt Spring Island was approved in 2008.

In addition to auditing and recommending laboratories for approval by the Provincial Health Officer, the EWQA was involved in a number of projects during the reporting period. For instance, in both 2007 and 2008, it held annual training workshops for auditors.

In 2006, the EWQA program prepared guidelines for evaluating the use of bacteriological media not in the *Standard Methods for the Examination of Water and Wastewater* (21st edition). Such evaluations allowed approval of these media in 2007 and 2008.



Section 2. Source Water Protection

Source water protection is an important component of the multi-barrier approach to ensuring safe drinking water. While it is not the ultimate solution for all drinking water problems, source water protection helps maintain source water quality by making sure it is not degraded through industrial, agricultural or recreational activities, or through land development.

Protecting sources of drinking water is complex and relies on the work of many individuals and organizations, including federal government departments, provincial government ministries and agencies, local governments, political leaders, non-governmental organizations, special interest groups, land users and the general public.

During the reporting period, government had a high-level commitment to water quality embodied in the goal to “Lead the world in sustainable environmental management, with the best air and water quality, and the best fisheries management, bar none.” This goal was articulated in the provincial government’s *Strategic Plan 2006/2007–2008/2009*, and was incorporated in each resource ministry’s strategic plan (www.bcbudget.gov.bc.ca/2007/serviceplans.htm).

During the reporting period, changes were made to legislation and regulations that have an impact on source waters.

For instance, regulations under the *Environmental Management Act* were introduced or updated and include measures that will serve to protect drinking water. The Code of Practice for the Slaughter and Poultry Processing Industries came into effect in June 2007 and provides for the regulation of discharge of waste water from slaughter facilities. Similarly, the Code of Practice for the Concrete and Concrete Products Industry, which came into effect March 1, 2008, prohibits process water and establishment runoff to pollute any groundwater.

Significant organizational changes were made to administration of source water protection oversight during the reporting period. Responsibilities for a wide range of source protection issues was transferred from the Ministry of Environment to the Ministry of Healthy Living and Sport in the summer of 2008. At that time, regional Ministry of Environment offices had staff assigned to a source water protection role while the central office functions related to health were transferred to the Ministry of Healthy Living and Sport. Various Ministry of Environment programs continue to monitor and assess water quality, including a water quality monitoring network which monitors raw water quality used as a source for drinking. During the reporting period, the Ministry of Environment continued to develop water quality

guidelines for specific water quality variables such as heavy metals and organic compounds in source water (based on the designated water use) and established water quality objectives to protect the most sensitive water use at a specific location. Water quality guidelines are available at www.env.gov.bc.ca/wat/wq/wq_guidelines.html, water quality objectives for specific water bodies are available at www.env.gov.bc.ca/wat/wq/wq_objectives.html.

To help water suppliers implement water conservation programs, the Ministry of Environment issued advisories when rivers experienced low stream flows. Further, Ministry staff worked with smaller local governments to develop and refine drought management plans and water restriction bylaws. The provincial government worked with the Township of Langley to make sure its Water Management Plan (the first of its kind in the province) ensures a safe and sustainable supply of groundwater to the community. Significant work on the plan has been undertaken, but it has yet to be approved and brought into effect by the provincial government.⁴

Progress in the area of designation of community watersheds, reported in *Progress on the Action Plan for Safe Drinking Water in British Columbia 2008*, faltered over the current reporting period. The Ministry of Environment continued to designate community watersheds under the *Forest and Range Practices Act*. Only one new community watershed was designated during the reporting period. Information on community watersheds is available at www.env.gov.bc.ca/wsd/data_searches/comm_watersheds/index.html.

The Forest and Range Evaluation Program is working to determine whether licensees are meeting government objectives. In the area of water quality, these objectives deal with stream bank erosion, landslides and livestock concerns. During the reporting period, forestry staff completed approximately 2,180 evaluations.

Other government ministries are also involved in protecting source water. During the reporting period, the Ministry of Agriculture and Lands continued to support the Environmental Farm Plan Program and the National Water Supply Expansion Program. These initiatives are described in more detail in the pages that follow.

2.1 Effective Strategies

Regulatory Changes

Given the extent of regulatory reform that occurred between 2002 and 2007, there were relatively few amendments to legislation during the reporting period. Amendments that were made tended to not directly affect drinking water source protection.

Ground Water Protection Regulation

The Ground Water Protection Regulation (GWPR), pursuant to the *Water Act*, came into full force on November 1, 2005.⁵ The regulation focuses on sanitary protection of groundwater wells and protection of aquifers as water supplies. Part 1 of the regulation deals with registration requirements for qualified well drillers and qualified pump installers; Part 2 deals with standards for well construction and closure.

Phase 2 of the regulation was proposed siting of wells to reduce risk of contamination and water use conflicts, additional standards for well construction and pump installation, controlling artesian flow, pump installation, well maintenance (not putting sources of contamination next to the well) and mandatory well log submission to increase knowledge of resources. The Ministry of Environment undertook efforts to develop Phase 2 of the GWPR between 2007 and 2009; however, no changes to the regulation have been made to achieve Phase 2 objectives. Currently, the Ministry of Environment is in the process of reviewing the *Water Act*, with the intent of modernizing it for the near future. It is expected that enhancements to the GWPR will be made as part of this process.

Shale Gas Exploration

Exploration for shale gas in BC increased during the reporting period. Shale gas extraction is a relatively new activity within the oil and gas industry but has significant potential in Northeast BC. Unlike more conventional oil and gas deposits, which can be accessed directly through a vertical bore hole, shale gas is tightly bound within shale deposits, which must be fractured to release the gas. The fracturing process involves drilling lateral bore holes through the shale formation and injecting large volumes of water containing a mixture of sand or other particulates and various chemicals into the formation

⁴ As of September 30, 2011, the plan had not been approved by order-in-council.

⁵ The regulation was promulgated in June 2004.

under very high pressures. This has the effect of forcing fine cracks throughout the shale; when the fluid is removed sand is left behind to maintain the cracks and allow gas to flow out of the formation.

Because so much water is used in shale gas operations (the amount varies depending on the number and length of lateral bore holes, but can be tens of thousands of cubic metres), concerns have been expressed about the potential to over-use available water sources. However much of the water use to date has occurred in areas with low population densities in the far northeast of the province. During the reporting period studies were being commenced to quantify water availability. Ministry of Energy and Mines, Geoscience BC, Ministry of Environment, University of Northern British Columbia and industry were working together to improve the understanding of surface water, shallow subsurface water and saline aquifers across northeast British Columbia. As part of this work, programs were being developed to increase baseline data and improve modelling through additional hydrometric stations, climate stations, piezometers and observation wells.

A large portion of the water used for hydraulic fracturing is returned to the surface as contaminated waste, so there is a possibility for extracted water to contaminate water sources, either during storage or transportation to treatment facilities. Additionally there is a possibility that shallow aquifers will be contaminated, either through leaks in the well casing or from upward migration of contaminants following the fracturing process. While shale gas extraction is a relatively recent activity in British Columbia, none of the technology being used is new. There are no known cases of fluids from shale development causing groundwater contamination in British Columbia and the industry engaged in shale gas exploration and extraction have measures in place to reduce the possibility of contamination of water sources, such as casing wells to depths below any existing groundwater, storing returned fluids in waterproof reservoirs until it is reused, treated or transported to off-site treatment and restricting hydraulic fracturing to depths well below drinking water sources.⁶

⁶ In 2010 BC introduced upgraded environmental considerations through the new Oil and Gas Activities Act which includes updated Drilling and Production Regulations and Environmental Protection and Management Regulations. The Act and regulations are available at www.bclaws.ca.

2.2 Aligned Management Systems

Budgets and Resources

In 2007/2008, approximately 28 full-time equivalent employees worked for the Ministry of Environment on water issues directly or indirectly involving drinking water. These staff included surface and groundwater technical specialists, source water protection specialists, policy analysts, monitoring and reporting staff, water technicians, impact assessment biologists and management. This summary of staff does not include compliance officers or toxic management and emergency response staff who are called out on an as-needed basis, providing additional resources in the protection of drinking water sources. In June 2008, significant restructuring of water and air monitoring and reporting was undertaken by government. This change involved the transfer of financial resources, FTEs and responsibilities to the Ministry of Healthy Living and Sport. Many of the responsibilities transferred to the Ministry of Healthy Living and Sport related to source water protection. Only one person was transferred. While this restructuring did not result in an immediate change in the number of people within government dedicated to source water protection, it did provide some opportunity for greater collaboration with health authority staff. The Ministry of Healthy Living and Sport subsequently expanded the number of staff available to support source water protection initiatives by five FTEs by the end of 2008/2009, and additional positions were in the process of being developed and filled.

Online Information Sharing

One of the six elements of the Water Sustainability Action Plan for British Columbia, and its key communications tool, is a website: www.waterbucket.ca. The site was launched in 2005/2006 and promotes projects and case studies related to water sustainability and conservation in BC. It brings together local governments, water utilities, water suppliers and managers to share information, practical tools and ideas related to “communities of interest” topic areas. Since its inception, the site has been expanded to include communities of interest on “Water Centric Planning” and “Agriculture and Water.” Funding for the website comes from a variety of sources. During the reporting period, aids to water suppliers that were developed by government and industry groups have been added to the website.

Source Water Quality Monitoring and Assessment Programs

A number of Ministry of Environment programs monitor, assess and report on water quality. These programs take into account many considerations, including drinking water source assessments and protection. Information on these programs is available on the Water Stewardship Division website: www.env.gov.bc.ca/wsd/plan_protect_sustain.

Water Quality Monitoring Network

The Water Quality Monitoring Network monitors raw water quality for drinking water and aquatic ecosystems. The program is delivered by regional staff from the Ministry of Environment. These staff have sampled about 250 groundwater wells and 135 surface water supplies that are used as drinking water sources. Activities include sample collection, shipping, analysis and data reporting, as well as some data assessments that will help support the development of water quality objectives. Publication of information collected from the monitoring network has not been formalized, although some reports are available on the Ministry of Environment EcoCat website at www.env.gov.bc.ca/ecocat/.

Water Quality Guidelines

BC Water Quality Guidelines are developed by the Water Protection and Sustainability Branch of the Ministry of Environment. The guidelines are science-based numerical concentration limits or narrative statements that set out acceptable ranges for specific water quality variables (such as arsenic) in source waters, based on the designated water use (such as drinking water or aquatic life). BC has established Water Quality Guidelines for 43 parameters. Guidelines are available at www.env.gov.bc.ca/wat/wq/wq_guidelines.html. Following the restructuring of government responsibilities in June 2008, the Ministry of Environment discontinued developing guidelines specifically for drinking water source use, but continued to develop general environmental guidelines that could be applied to water bodies that are drinking water sources.

A key challenge faced by agencies developing guidelines and other water quality criteria is ensuring that they are kept up to date. For example the Ministry of Environment maintains a source water quality objective for arsenic of 25 parts per billion based on the 2001 Canadian Council

of Ministers of Environment (CCME) Water Quality Guidelines for Arsenic, while Health Canada revised the national drinking water guideline from 25 parts per billion to 10 parts per billion in 2006.

Water Quality Assessments and Objectives

The Ministry of Environment also establishes Water Quality Objectives for a range of water quality parameters in specific water bodies (such as individual community watersheds) based on monitoring results. Water Quality Objectives are derived from Water Quality Guidelines and are set to protect the most sensitive designated water use at a specific location, taking local circumstances into account. There are more than 50 approved Water Quality Objectives reports covering more than 150 water bodies in BC, and they are available at www.env.gov.bc.ca/wat/wq/wq_objectives.html.

Agriculture and Source Water Protection Programs

As previously reported, the Ministry of Agriculture and Lands has been involved with a number of linked programs and initiatives that deal with source water protection and conservation, including studies about soil nutrients, advisories and projects related to manure loading, the Environmental Farm Plan Program, the National Water Supply Expansion Program and water metering.

Soil Nutrients

In 2007, the Ministry of Agriculture and Lands undertook an Okanagan agricultural soil study. The study measured levels of soil nutrients and, among other considerations, assessed the risks that they pose to aquatic ecosystems. Elevated levels of nutrients in soil can run into water bodies or leach into aquifers, impacting source water quality. Study results are available at www.agf.gov.bc.ca/resmgmt/EnviroFarmPlanning/OK_AgricSoilStudy2007/Okanagan_Soil_Report_2007.pdf. In general, the study found relatively low levels of nitrate-nitrogen in the soil, but higher levels of phosphorus with a greater risk of water contamination. One of the study's conclusions is that "Attention is required for appropriate application rates of phosphorus amendments and management practices that will minimize the potential for phosphorus transport to surface water."⁷

⁷ Kowalenko CF, Schmid O, Kenney E, Neilsen D, Poon D. Okanagan agricultural soil study 2007. British Columbia: BC Agricultural Policy Framework Environment Chapter Working Group; 2009 Dec.

Manure Loading

In both 2007/2008 and 2008/2009, advisories were issued to farmers in the south coast region telling them when it was appropriate to apply manure to their fields. This was done to ensure that manure was applied in a manner that fertilizes crops but protects water quality. Ideally manure is applied when crops are most likely to take up the nutrients from the manure and at times when run-off is least likely to occur. Similar advisories are not as critical in the interior, since manure cannot be applied to frozen or snow-covered ground, and by the time manure can be applied run-off and leaching into aquifers are unlikely.

Environmental Farm Plan Program

The Environmental Farm Plan Program is a voluntary program, funded by the federal and provincial governments, that provides financial incentives to agricultural producers who enhance the environmental performance of their farms. A key component of environmental farm plans is the development of beneficial management practices, including waste management, which was one of the most common beneficial management practices incorporated into plans during the reporting period.

In 2008/2009, over 700 producers participated in the program and 523 Environmental Farm Plans were completed covering 256,687 acres in British Columbia. There were 550 Beneficial Management practices (projects) completed.

Over the reporting period the program paid over \$35 million to producers in support of beneficial management plan development and commitments currently exist to continue the program through to the end of the 2011 fiscal year.

Ground Water Protection Regulation Implementation
Starting in 2005, the Ministry of Environment has been implementing the Ground Water Protection Regulation (GWPR) through compliance promotion, registration of well drillers and well pump installers, compliance audits, enhancement of the WELLS database and processing of submitted well reports, and building internal capacity.

Compliance Audits

The GWPR places requirements on well drillers and pump installers by establishing standards for constructing wells and qualifications for drillers and pump installers. In 2007, staff with the Water Stewardship Division developed an

inspection approach and field procedures to determine the level of compliance with the regulation. Regional staff were trained in inspecting wells in 2007/2008 and undertook 37 field inspections of newly drilled wells in 2008/2009. Not all of these wells were inspected for all elements of the program (e.g., depending on when the inspection took place, some part of the well, such as the sanitary seal may already have been covered in the ground and not accessible for inspection).

The primary objectives of the GWPR compliance project were to conduct field inspections province-wide to determine if GWPR requirements were being met, specifically:

- if the drillers were registered at the time of drilling;
- if the drillers' sealing, capping, well identification and wellhead completion practices met the regulation;
- to ascertain the overall level of compliance; and
- to identify inspection challenges.

Of 32 wells inspected where the owner knew who the well driller was, all but two had been drilled by, or under the supervision of, a registered well driller.

Of those wells for which data were available, all had a well cap, although three did not have vermin-proof well caps. In addition, all wells had adequate stick-ups (wells are required to stick up 0.3 m above ground), but in two cases the well owner had subsequently landscaped around the well, resulting in inadequate stick-up. Six of 25 wells did not have surface seals to prevent contaminated water from running down the side of the well casing directly to the water being pumped from the well. Five of these wells had been drilled by the same individual. No wells were found to be in violation of the setback distances from septic systems established under the *Public Health Act*.

The driller who had omitted surface seals on the five wells was advised of the non-compliance and voluntarily retrofitted the wells with surface seals.

Registration of Well Drillers and Well Pump Installers

As indicated earlier, some well drillers and well pump installers have been working without being registered in accordance with the GWPR. The Ministry of Environment continues to raise awareness about the need for drillers and pump installers to be registered in order to do any well pump

installation work. During 2007/2008 two well drillers and six well pump installers were registered, and during 2008/2009 11 drillers and five installers were registered. A list of qualified well drillers and pump installers is available to the public through the Ministry of Environment website: www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/wells.html#reg.

Enhancement of the WELLS Database and Submission of Well Reports

In 2007/2008, the Water Stewardship Division received well identification information for 66 public water supply system wells and entered the data into the Ministry's WELLS database (www.env.gov.bc.ca/wsd/data_searches/wells/index.html). The Division also received 80 well closure reports.

During the same time period, the Water Stewardship Division received approximately 1,500 well construction reports from drillers and processed them all into WELLS. The reports, when properly completed, provide valuable information on local groundwater resources and allow staff to better assess and identify issues related to compliance with well construction standards. However, a significant portion of the well records lacked detailed information about the location of the well.

In 2008/2009, well identification information was received for an additional 102 public water supply system wells, and the data were entered into the Ministry's WELLS database. The Division also received 143 well closure reports.

During the same time period, the Water Stewardship Division received approximately 1,885 well construction reports from drillers and processed them all into WELLS. However, approximately 1,480 of those records lacked detailed information about the location of the well. Ministry of Environment staff are working with water suppliers, well drillers and drinking water officers to improve data on well locations. Most well drillers now provide data from hand-held GPS units as well as property identifiers; however, where information is provided for previously constructed wells, it can be difficult to link data for one well that are captured at different times for different purposes. For example, some information is provided when wells are originally constructed, and additional information is provided when well tags are attached to the well at a later date, but it may not be possible to connect data from the well log to the well tag information, particularly if several wells are located in the same general area.

The Division also partnered with the BC Ground Water Association to develop and deliver technical workshops for drillers.

Well Protection Information for Planners

During the reporting period, the Ministry of Environment collected well protection plans, and posted them on EcoCat, the provincial ecological reports catalogue (www.env.gov.bc.ca/ecocat/). To date, there are over 24 well protection plans posted on EcoCat for communities throughout BC. These reports have been collected through the Ministry of Community Services (the development of a well protection plan can be a condition of an infrastructure grant) and from health authorities (the development of a plan may be a condition on the operating permit issued by the drinking water officer).

In addition to providing these reports electronically over the web, the Ministry of Environment has been digitizing the capture zones⁸ provided in the reports and uploading these polygons to the Land Resource Data Warehouse (LRDW), where there is a capture zone layer. Work continues on improvements to this capture zone layer to make it more understandable, as well as to provide a link to the well protection plan. There are capture zones available on the web for 33 different communities in BC, and they can be accessed through Imap or the BC Water Resource Atlas at www.env.gov.bc.ca/wsd/data_searches/wrbc/index.html. The BC Water Resources Atlas is a comprehensive, web-based, information tool available for use by anyone interested or involved in water protection and management in British Columbia. It is part of an ongoing effort by the Ministry of Environment to improve public access to environmental information. The Ministry's goal is to provide information that will lead to better surface and groundwater management and protection.

Over the past several years, the Ministry of Environment has been working with partners such as local governments, the federal government and universities to develop aquifer intrinsic vulnerability maps. Intrinsic vulnerability maps are available on the web through Imap for all of Vancouver Island, the Grand Forks aquifer, the North Okanagan and the Oliver area. The maps are linked to reports on Ecocat that outline the methodology and work done to generate the maps. A guidance document on how local governments can use

⁸ A capture zone is the area of land that contributes water to a well.

these maps in their planning processes, such as Official Community Plans and/or development permits, is under development. The intrinsic vulnerability maps were developed to aid decision-makers (primarily local government planners) with land-use decisions to protect source water (ground water) resources for future generations.

Drought Management

The Ministry of Environment helped smaller local governments develop and refine their drought management plans and water restriction bylaws. It also provided broader support for considering drought when developing regional growth strategies in areas like the Okanagan.⁹

The River Forecast Centre monitors and analyses run-off conditions in the province throughout the year. It publishes monthly information bulletins. When drier than normal conditions materialize, these information bulletins are distributed to water purveyors, local industry and stewardship groups in impacted geographic regions.

2.3 Performance Measurement and Reporting

Forest Practices Board

One of the most common concerns that water suppliers and individuals have with respect to contamination of their source waters is activity associated with forest and range activities.

The Forest Practices Board conducts audits and investigations and issues public reports on how well industry and government are meeting the intent of British Columbia's forest practices legislation. The Board has an arms-length relationship from government and a mandate to hold both government and the forest industry publicly accountable for forestry practices. It chooses which operations to audit, and its reports and findings are published without government revisions.

By law, the board must audit government and industry forestry practices, and it must deal with complaints from the public regarding forest practices and government enforcement. In addition, it may appeal enforcement decisions and penalties imposed by government, seek review of government decisions to approve plans for forestry operations, and carry out special investigations.

In 2007, the board released the report *Effectiveness of Investigations: Water-Related Complaints Case Study 2006*. This report provided an overview of investigations related to water conducted between 1996 and 2005. The board investigated 126 complaints, only 29 of which related to water. The board interviewed complainants, forest licensees and government officials involved with 20 of the complaints, to determine whether or not they were satisfied with the investigations undertaken by the board. Eighty-two per cent of complainants did not feel the board helped resolve their concerns, while 86 per cent of licensees felt the board's involvement did help. The full report is available at www.fpb.gov.bc.ca/publications.aspx?id=3082&terms=Effectiveness+of+Investigations.

During the reporting period, the board published reports on four investigations of water-related complaints. The board recognised that some complaints were valid with respect to practices of concern and worked with licensees and complainants to address issues such as deactivating skid trails and roads before freshet and conducting terrain stability field assessments. Reports are available at www.fpb.gov.bc.ca/reportsearch.aspx.

Forest and Range Evaluation Program

The Forest and Range Evaluation Program is designed to assess the effectiveness of the *Forest and Range Practices Act* in meeting the provincial government's objectives for each of the forest and range values under the Act. Water is one of 11 resource values. The *Forest and Range Practices Act* is largely outcome-based, with licensees being required to meet government objectives through best practices, though those practices are not themselves prescribed in law. To determine whether licensees are meeting those objectives, the Forest and Range Evaluation Program has developed "effectiveness evaluations", which use selected indicators or attributes of a particular resource value to determine the effects of forest management on the value. The effectiveness evaluation for water, finalized in March 2009, evaluates parameters such as stream bank erosion, sediment loading, landslides and livestock concerns. Checklists and field forms have been prepared to standardize the evaluation process. Information on the evaluation program can be found at www.for.gov.bc.ca/hspfrep/values/water.htm.

⁹ Subsequent to the reporting period a BC Drought Response Plan has been completed, and is available at www.env.gov.bc.ca/usd/public_safety/drought_info/cabinet/bc_drought_response_plan_june-2010.pdf.

The 2007 field season represented the second year of voluntary resource stewardship monitoring for water quality. This monitoring determines whether forestry practices are protecting water quality or increasing the risk of drinking water health hazards. Evaluations focus on assessing the potential of bare ground to become a fine sediment source in water bodies. Sixty-seven staff members from 19 forest districts and six Ministry of Environment districts participated in five two-day formal training sessions. During the 2007 field season, 537 checklists representing 117 sample areas and 14 forest districts were reviewed and submitted for data entry. During the 2008 field season an additional 665 sites were monitored. All 1,202 sites were evaluated, and a report on the water quality effectiveness evaluation program and the results of these two field seasons is available at www.for.gov.bc.ca/hsp/frep/publications/extension_notes.htm.

According to the report, 71 per cent of sites were rated “very low” or “low” for potential sediment generation, indicating water quality is being preserved. Twenty-five per cent of the sites were rated “moderate”, and 6 per cent were rated “high” or “very high” for potential sediment generation. The report also identified specific management actions, cited through field evaluations, that resulted in low levels of fine sediment generation or that could have improved water quality at sample sites with a “moderate” or “high” to “very high” water quality impact. Recommended actions included

- installing more frequent, strategically placed culverts;
- armouring or re-vegetating disturbed ground as soon as possible after construction; and
- providing effective and timely road maintenance that is in balance with the risk to the road, its users and the environment.

Low Streamflow Advisories

The Ministry of Environment issues advisories through its River Forecast Centre when rivers experience low streamflows. The advisories are in newsletter format and provide context for the advisory and information on a range of related subjects, including how low flows can impact drinking water. These advisories help water suppliers implement their water conservation programs in a timely and effective manner. These advisories (from June 2005 forward), along with snow

survey bulletins and information about groundwater supplies, are posted on the Ministry of Environment’s website at www.env.gov.bc.ca/rfc.

Provincial Government Performance

Each government ministry publishes an annual service plan report, which details progress on its goals, objectives, strategies and performance results. The reports also provide information on resources spent in each program area and the number of full-time equivalent employees, as well as capital expenditures in the ministry. The reports are posted on each ministry’s website.

All resource ministries, as well as the Ministry of Community and Rural Development and the Ministry of Healthy Living and Sport, have incorporated the provincial government’s goal of “Lead the world in sustainable environmental management, with the best air and water quality, and the best fisheries management, bar none.” For example, the Ministry of Environment incorporated the performance measure of the percentage of water bodies monitored under the Canada–BC Water Quality Monitoring Agreement that have stable or improving water quality trends. The percentage in 2007/2008 and 2008/2009 that meet the performance measure has remained at 96 per cent, which is on track to meet the target of 96 per cent or greater by 2012/2013. Surface water quality is measured using environmentally significant variables such as temperature, pH and the presence of nutrients and metals. Thirty-two water bodies are measured under the agreement and reports on data collected from as long ago as 1968 are available at www.env.gov.bc.ca/wat/wq/wq_sediment.html.

EcoCat

EcoCat, an ecological reports catalogue maintained by the Ministry of Environment, provides access to digital reports and publications, and their associated files such as maps, datasets and published inventory information. EcoCat contains a wide variety of reports including floodplain maps, water system assessments and drinking water source protection plans. The catalogue is located at www.env.gov.bc.ca/ecocat/.

Section 3. Integration

The delivery of safe drinking water is a complex process involving many partners. It requires the cooperation and dedication of water suppliers, local governments, health authorities, federal and provincial government agencies and ministries, First Nations and the general public. Everyone has a role to play.

By 2007, procedures were in place to ensure that government coordinated activities across ministries and engaged with federal and other agencies as appropriate. In 2007/2008 and 2008/2009, the provincial government continued to move forward on initiatives to improve communication and coordination on drinking water issues and projects across sectors. During the reporting period, previously established committees continued to oversee this work, including the Assistant Deputy Ministers' Committee on Water, the Directors' Inter-Agency Committee on Drinking Water, the Drinking Water Leadership Council, and federal-provincial-territorial coordinating committees (the Federal-Provincial-Territorial Committee on Drinking Water and the Federal-Provincial-Territorial Committee on Health and the Environment).

Highlights of their accomplishments include:

- Establishment of regional drinking water teams under a Memorandum of Understanding (MOU) on Inter-Agency

Accountability and Coordination on Drinking Water Protection, which describes the responsibilities and accountabilities of the Office of the Provincial Health Officer, the regional health authorities and the various government ministries responsible for all aspects of drinking water protection.

- Finalization of a high-level Water Action Plan for BC. The provincial government has made a high-level commitment to "Lead the world in sustainable environmental management, with the best air and water quality, and the best fisheries management, bar none." To meet this goal with respect to water quality, the Ministry of Environment has taken a lead role in developing a cross-government strategy to address water quality and quantity issues in a coordinated manner. The plan, *Living Water Smart*, is available at www.livingwatersmart.ca/book/.

In First Nations communities, Health Canada's community-based Drinking Water Safety Program monitors and promotes the safety of drinking water supplies and participates on the Drinking Water Leadership Council.

The following sections provide details on the above groups and initiatives and how they are integrating programs, policies and information across ministries and with other organizations.

3.1 Effective Strategies

MOU on Inter-Agency Accountability and Coordination on Drinking Water Protection

This MOU was developed to describe the responsibilities related to drinking water protection of various ministries (Agriculture and Lands; Energy, Mines and Petroleum Resources; Environment; Community and Rural Development; Healthy Living and Sport; Forests and Range; Transportation and Infrastructure), the Office of the Provincial Health Officer, and the five regional health authorities. The MOU also describes the accountability of each agency for coordinating source protection, land-use planning and infrastructure.

The MOU mandates that regional drinking water teams be established. In 2007/2008, regional drinking water teams were established in all five health authorities, with the Vancouver Island team being modified from an existing Vancouver Island Watershed Protection Steering Committee.

Under terms of the MOU, regional protocols to include drinking water coordination activities within each ministry and agency were under development during the reporting period. The regional protocols vary from one regional team to another, and all of the teams are continuing to modify their protocols based on experience and changing needs. The regional teams function as a forum for discussion between agencies and have been beneficial in establishing a closer working relationship between regional staff as well as providing a multi-agency group to address regional issues. For example, the northern regional drinking water team provided support in principle to the City of Dawson Creek in the city's efforts to develop a proactive water stewardship program for the Kiskatinaw River Watershed.

Regional teams produce annual reports on their activities and submit them to the Directors' Inter-Agency Committee on Drinking Water. No formal protocol exists requiring these reports to be made available to the public; however, health authorities have posted some information about their teams on their websites.

The MOU can be accessed through the Ministry of Health website at www.health.gov.bc.ca/protect/dwppublications.html.

3.2 Aligned Management Systems

Inter-Agency Management Committees

Assistant Deputy Ministers' Committee on Water

In 2007/2008 and 2008/2009, the Assistant Deputy Ministers' (ADMs') Committee on Water focused largely on the development of a cross-government Water Action Plan for British Columbia, subsequently published as *Living Water Smart* (available at www.livingwatersmart.ca/book/).

The committee also addressed issues related to flooding and reviewed and considered reports from the regional drinking water teams, and provided feedback on the transfer of health-related water responsibilities from the Ministry of Environment to the Ministry of Healthy Living and Sport. Ministries represented on the committee also provided financial support for a Drinking Water Information Initiative, which was intended to develop detailed business requirements for information needed from the public health information project and existing provincial databases.

The initiative's document was tabled with the committee in 2008, but it contained gaps that limited its practical value in further progress to develop a comprehensive drinking water information system.

This committee was dissolved subsequent to the reporting period.

Directors' Inter-Agency Committee on Drinking Water

This committee is made up of representatives from seven ministries and the Office of the Provincial Health Officer.

It reports to the ADMs' Committee on Water and is led by the Ministry of Healthy Living and Sport. During the reporting period, the committee served as a forum for cross-ministry discussion and coordination of a number of issues and initiatives, including

- Establishment of regional teams under the MOU on Inter-Agency Accountability and Coordination on Drinking Water Protection.
- Cross-governmental referral procedures during land-use management decisions.
- Source water protection concerns related to logging and mineral exploration.
- Water supply management and water quality concerns associated with the creation of new subdivisions.

A Small Water Systems Working Group, established in 2006/2007 by the committee to develop a provincial strategy for small water systems, met periodically over the reporting period, but did not finalize any deliverables for the committee's consideration.

Drinking Water Leadership Council

The Drinking Water Leadership Council met monthly throughout 2007/2008, alternating between conference calls and face-to-face meetings. Meetings were less frequent during 2008/2009. During the reporting period, the council undertook a number of activities to promote consistency between health authorities. The council's primary projects included

- Providing advice to the Ministry of Health regarding amendments to the Sanitary Regulation associated with an initiative to replace the *Health Act* with a modernized *Public Health Act*.
- Developing a Turbidity Decision Tree to guide drinking water officers dealing with turbidity events in source waters, particularly where available treatment does not address turbidity concerns.
- Sharing information about the development of health authority and ministry public complaints processes prior to making them available on their websites.
- Providing advice regarding a province-wide policy related to the provision of drinking water to immunocompromised individuals.
- Identifying solutions to challenges faced by small water systems.
- Discussing how issues associated with certification of water system operators by the Environmental Operators Certification Program impact operational considerations of drinking water officers when they evaluate the necessary qualifications of small water system operators.

Regional Drinking Water Teams

Most teams met at least quarterly between October 2007 and March 31, 2009. Some, notably the Vancouver Coastal Team, met on a frequent basis to deal with specific items concerning watershed-specific issues (i.e., Chapman Creek and Jefferd Creek watersheds). Most teams, except Vancouver Coastal, are using or are considering creating working groups to address specific issues, keeping the regional team meetings

to discuss broad issues affecting the region as a whole. Coordination and information-sharing with the Inter-Agency Management Committee (IAMC) from the Integrated Land Management Bureau (ILMB) varies: Northern Health and Interior Health in particular having strong linkages with this land use senior management committee and/or its subgroups. Two-way linkages were under development between IAMC sub-regional resource management coordinating groups and the regional drinking water teams to ensure knowledge transfer and proactive information-sharing and problem-solving. Information from the regional teams is shared with the individual ministries through the Directors' Inter-Agency Committee on Drinking Water, through the Ministry of Healthy Living and Sport, and through respective health authority contacts on the Drinking Water Leadership Council.

A summary of general issues that were addressed by regional drinking water teams during the reporting period include

- Beginning the development of standard approval and referral protocols for ministries' activities that potentially impact drinking water sources (e.g., identification of activities that should be referred to drinking water officers prior to approval of a resource-based activity in a community watershed), based on the intent behind the Inter-agency Communication and Coordinating Chart.¹⁰
- Identifying key contacts for the team from each representative ministry.
- Establishing the level of participation of ministry members on regional drinking water teams. Some teams have experienced difficulty in achieving full participation of all ministries. For example, the Southern Interior Drinking Water Team had a ministry participation rate for two meetings in 2008 of 30 per cent and 60 per cent.
- Establishing local government involvement on regional teams. The issue of local government involvement is still being investigated. Teams have been provided with the contact information for local government associations in order to assist them in seeking local government advice on how to involve them in discussions. Options that have been

¹⁰ For example, Interior Health Authority developed a guidance document to assist land users in understanding their obligations to protect drinking water sources and how they could meet that requirement. This document was subsequently taken to the Southern Interior Regional Drinking Water Team and was used to develop the document Considerations for Officials Approving Activities that Affect Drinking Water Guidelines. These documents were last updated in April 2009.

considered for involving local governments include, but are not limited to, the following:

- o Providing all regional districts with copies of the agendas and an invitation to participate.
- o Inviting one or two representative from local government (professional-level staff).
- o Inviting specific local governments on an ad-hoc, issue-specific basis.
- o Apprising local governments of the existence and scope of practice of the regional drinking water team and informing them of their ability to bring local issues forward to the regional team.
- The Vancouver Island, Fraser and Vancouver Coastal Regional Drinking Water Teams have regular participation by local governments. In addition to giving local government the opportunity to participate on specific issues of concern, the local government representatives also provide useful perspective and context advice across the spectrum of issues discussed at meetings. The larger areas of the Northern and Interior Health Authorities and the large number of local governments in the Interior present greater challenges for engaging local governments directly on these regional teams. The Northern Regional Drinking Water Team has had periodic involvement with specific local governments, and both the Interior and the Northern Regional Teams have developed processes to engage local governments and ensure that they have a place to take their concerns about drinking water and cross-ministry jurisdictional issues.

During the reporting period, regional teams identified concerns related to land-use management and source water protection that were forwarded to the ADMs' Committee on Water through the Directors' Inter-Agency Committee on Drinking Water. These concerns were brought forward either through issue-specific communication with the Directors' committee or through annual reports, and include the following:

- The need for a more coordinated approach to drinking water protection.
- Perceived health hazards under the *Drinking Water Protection Act* may not be adequately recognised in the

decision processes that influence land-use decisions (e.g., approvals of road construction, logging, mining, grazing).

- The lack of water supplier ownership of land around drinking water intakes, which leaves water suppliers dependent on other parties for source water protection when they identify threats to their water sources.
- The need for improved drinking water protection from recreational activity in drinking water source watersheds.

Federal-Provincial-Territorial Coordinating Bodies

The Ministry of Healthy Living and Sport is actively involved in a number of national committees that coordinate drinking water activities across the country. These committees include the Federal-Provincial-Territorial Committee on Health and the Environment (CHE) and the Federal-Provincial-Territorial Committee on Drinking Water (CDW). These committees establish the *Guidelines for Canadian Drinking Water Quality*, published by Health Canada. During the reporting period, the CDW rescinded the guideline for bromodichloromethane and approved new and revised guidelines for benzene, chloral hydrate, chlorine, haloacetic acids, potassium and radiological parameters. The CHE has subsequently approved all of these guidelines, which are available at www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/index-eng.php#tech_doc.

The CDW also sponsors a national drinking water conference every two years, which brings together experts to share the latest research and activities related to drinking water quality and management. For information about this committee and its work, see the Health Canada website at www.hc-sc.gc.ca/ewh-semt/water-eau/drink-potab/fpt/index-eng.php.

Drinking Water in First Nations Communities

The Drinking Water Safety Program, part of Health Canada's First Nations and Inuit Health Environmental Health Services program, is a community-based program that works with First Nations to monitor and ensure the safety of drinking water.

In April 2008, Indian and Northern Affairs Canada (INAC) and Health Canada announced a \$330 million two-year First Nations Water and Wastewater Action Plan (FNWWAP). The plan includes measures to conduct a national assessment of water and wastewater systems, to increase the number of circuit rider trainer positions in the Circuit Rider Training Program and to clarify standards by revising the existing

drinking water protocol and developing additional protocols for wastewater systems and small systems.

The national assessment of water and wastewater systems in First Nation communities began in March 2009.

The federal government also announced its intention to establish a legislative framework governing water supplies on First Nations reserves. No legislation was tabled during the reporting period; however, the federal government has indicated that their preferred policy direction will be to adopt provincial legislation by reference. This would mean that sections of the *Drinking Water Protection Act* and, potentially, sections of other legislation such as the *Water Act* or Ground Water Protection Regulation, could be made applicable to reserves and be administered by federal authorities, either directly or through agreements with provincial agencies.

Information on programs and activities undertaken by INAC related to drinking water on First Nations reserves is available at www.aadnc-aandc.gc.ca/eng/1100100035066/1100100035070.

Source Water Protection Activities

Source water protection requires considerable integration and coordination between provincial, federal and local governments, as well as industry and recreation groups and other stakeholders. Details are provided in Section 2.

3.3 Performance Measurement and Reporting Ombudsperson

In 2008, the Ombudsperson released the report *Fit to Drink: Challenges in Providing Safe Drinking Water in British Columbia*, available at www.ombudsman.bc.ca/resources-and-publications. The focus of this report was not integration across government; however, cross-government challenges related to the creation and regulation of small systems were discussed and a recommendation was made to government to move forward with addressing small system challenges.

In response to recommendations by the Ombudsperson, the Ministry of Healthy Living and Sport worked with the Ministry of Environment and the Ministry of Transportation and Infrastructure to improve notification to health authorities when small water systems are created or licensed, and created an addendum to the *Drinking Water Officers' Guide* to facilitate the identification of small systems.

Websites

Government websites that relate to drinking water continue to have numerous linkages to other relevant government websites; this is particularly true of sites hosted by the Ministry of Healthy Living and Sport and the Ministry of Environment. As it currently stands, a person who is interested in accountability reports related to water or source water protection would need to search multiple sites to locate relevant reports (e.g., compliance reports issued by the Forest Practices Board are located separately from compliance reports on water well construction issued by the Ministry of Environment).

Additional key websites with extensive information on water are the Waterbucket website (www.waterbucket.ca) and the Sustainable Infrastructure Society website (www.sustainis.org/). Each of these sites provides links to more online resources.

A possible area for improvement would be the development of one public portal with linkages to all websites of relevance to drinking water, source water protection and relevant land-use management in British Columbia.

Drinking Water Information Management

Drinking water information management has been the topic of recommendations of several public reports, including *Progress on the Action Plan for Safe Drinking Water in British Columbia* (2007). This report included the following recommendation:

The systematic collection of better information about drinking water quality conditions in the province is needed. The drinking water information management project needs to be completed to ensure drinking water officers and the Provincial Health Officer have ready access to all data needed to administer and report on activities under the *Drinking Water Protection Act*. These data include those needed to hold water suppliers, drinking water officers and the government accountable through public reporting. (Leads: Ministry of Healthy Living and Sport and Ministry of Environment).

The following year, in the report *Progress on the Action Plan for Safe Drinking Water in British Columbia* 2008, there were discussions about the ongoing inability of government, health authorities and water suppliers to readily access data

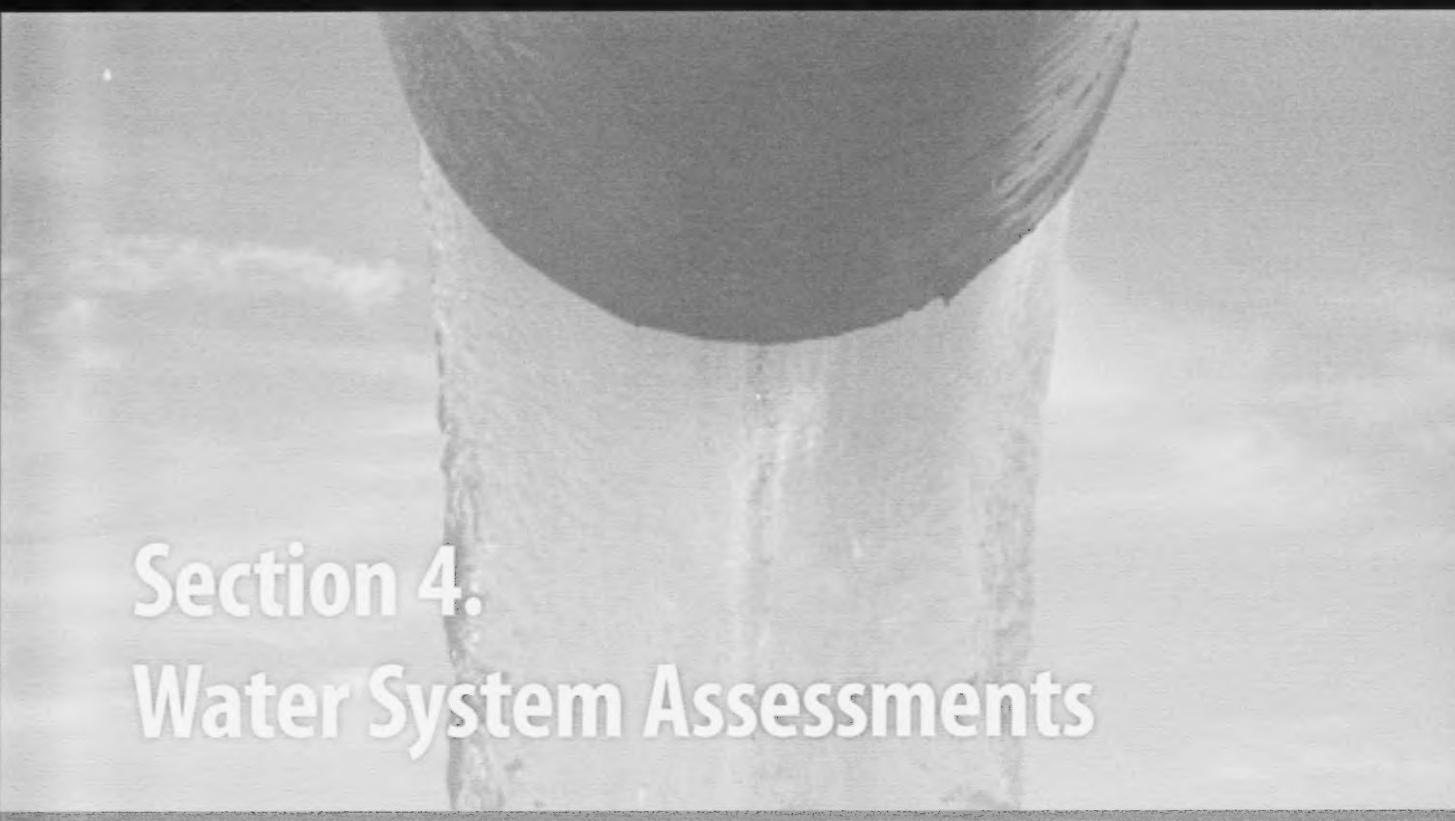
about water supplies that could improve land-use decisions and help manage risks to source water. Although the first drinking water information management project was initiated by the Ministry of Health in 2003, the situation of inadequate information infrastructure persists. The 2008 recommendation from *Progress on the Action Plan for Safe Drinking Water in British Columbia* 2008 stated the following:

An Environmental Health/Health Protection Application should be completed by December 2009. A system to allow government staff, health authority staff, water suppliers and their agents, and the general public to access all data relevant to drinking water systems or drinking water protection, which is not subject to protection of privacy requirements, should be developed by December 2010. (Lead: Ministry of Health).

Funding had been identified for the acquisition of an Environmental Health/Health Protection application that met the needs of the health authorities and the province as part of a larger public health information systems project. The intent was to implement a consistent information system for collecting drinking water data in all health authorities and to link it to public health data to facilitate local and provincial uses such as disease surveillance, source water protection and land-use management.

Canadian vendors were invited to respond to a request for proposals. By the Spring of 2009, the process was complete but was not successful in identifying an off-the-shelf environmental health application. Subsequently, the health authorities' Health Protection Directors met to review options for moving forward. The findings of this review were presented to Executive from the Ministry of Healthy Living and Sport and the Ministry of Health Services. There was no regional support to develop a custom application. In addition, there was no support for re-issuing a request for proposal for an off-the-shelf application, as too little time had passed to allow for major market developments. The designated funds were reallocated within the eHealth portfolio of projects. There is no currently active provincial project that would respond to the drinking water information system recommendations in the 2007 and 2008 reports. The regional health authorities continue to use several versions of two

information systems, with improvements in their functionality but with many of the same deficits identified in earlier reports, particularly the inability to easily report on many key indicators and a lack of linkages to other water-related data management systems. The Provincial Health Officer, the Provincial Drinking Water Officer and the provincial Health Protection Branch staff do not have ready access to an application that would supply the data needed to improve administration and reporting activities under the *Drinking Water Protection Act*.



Section 4. Water System Assessments

Drinking water system assessments are critical to gaining an understanding of the state of BC's drinking water supplies and what needs to be done to improve them. For instance, systems that have been assessed high hazard ratings can be assigned higher priority for infrastructure upgrades or other improvements. During the reporting period, the Ministry of Community and Rural Development provided 54 grants to communities to help them plan for improvements to their drinking water systems.

More than 4,800 water systems inspections were conducted during the reporting period, and 4,077 of the province's 4,550 water supply systems had been assigned hazard ratings by March 31, 2009. Data collection and reporting remains inconsistent and incomplete; however, by the end of the reporting period, there were only 502 systems without a hazard rating, down from 1,091 at the beginning of the reporting period.

The assessment tool developed by an inter-ministerial team during the last reporting period (the Comprehensive Source-to-Tap Assessment Guideline) is being used by drinking water officers in the health authorities. The tool was under revision during the reporting period.

4.1 Effective Strategies

No changes were made to the strategies related to water system assessments in Part 3 of the *Drinking Water Protection Act* and Section 15 of the Drinking Water Protection Regulation (discussed in the 2007 report, *Progress on the Action Plan for Safe Drinking Water in British Columbia*).

A significant change in tangible asset management by local governments was brought into effect in January 2009. This change requires local governments to undertake an inventory of all of their assets, including their drinking water infrastructure (when it was installed, its useful life and historical costs). This requirement will facilitate water system assessment and planning for future maintenance and replacement schedules. Details are provided in Section 8.1.

4.2 Aligned Management Systems

Planning Grants

The Ministry of Community and Rural Development provides grants to communities to help them plan for infrastructure upgrades. The grants have been used for assessing a variety of system needs and have included engineering studies, infrastructure assessments, water metering pilot projects, water treatment plans, well protection plans, and so on. In 2007/2008, the province provided approximately \$500,000 in support of 54 projects, with a total estimated cost of \$1,500,000. In 2008/2009, an additional \$434,000 was provided by the province to fund 47 planning projects.

Well Protection Toolkit

The Well Protection Toolkit, which was updated in 2006, shows communities, in six steps, how to develop and put into place a well protection plan to prevent contamination of their groundwater supply. The plan includes an assessment of well(s) or aquifers that the community relies on for their water source, delineation of the area that supplies water to the well, an inventory of potential threats to water quality and measures to manage or eliminate those threats. The toolkit is available at www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/wells/well_protection/acrobat.html.

Well or aquifer protection plans have been required by drinking water officers as conditions of operating permits, or as part of an assessment response plan, and by the Ministry of Community and Rural Development as a condition of

receiving infrastructure grant funding. Many communities have also engaged in well protection planning on their own initiative. Twenty-four well protection plans are available on the provincial government's EcoCat website at www.env.gov.bc.ca/ecocat/.

Comprehensive Source-to-Tap Assessment Guideline

In 2006/2007, the Ministry of Healthy Living and Sport completed an evaluation of the Comprehensive Source-to-Tap Assessment Guideline. Based on this assessment, the guideline was being revised during 2008/2009. The completed guideline is available at www.health.gov.bc.ca/protect/sourcee.html.

4.3 Performance Measurement and Reporting

Drinking Water Systems Inspected and Hazard Ratings Assigned

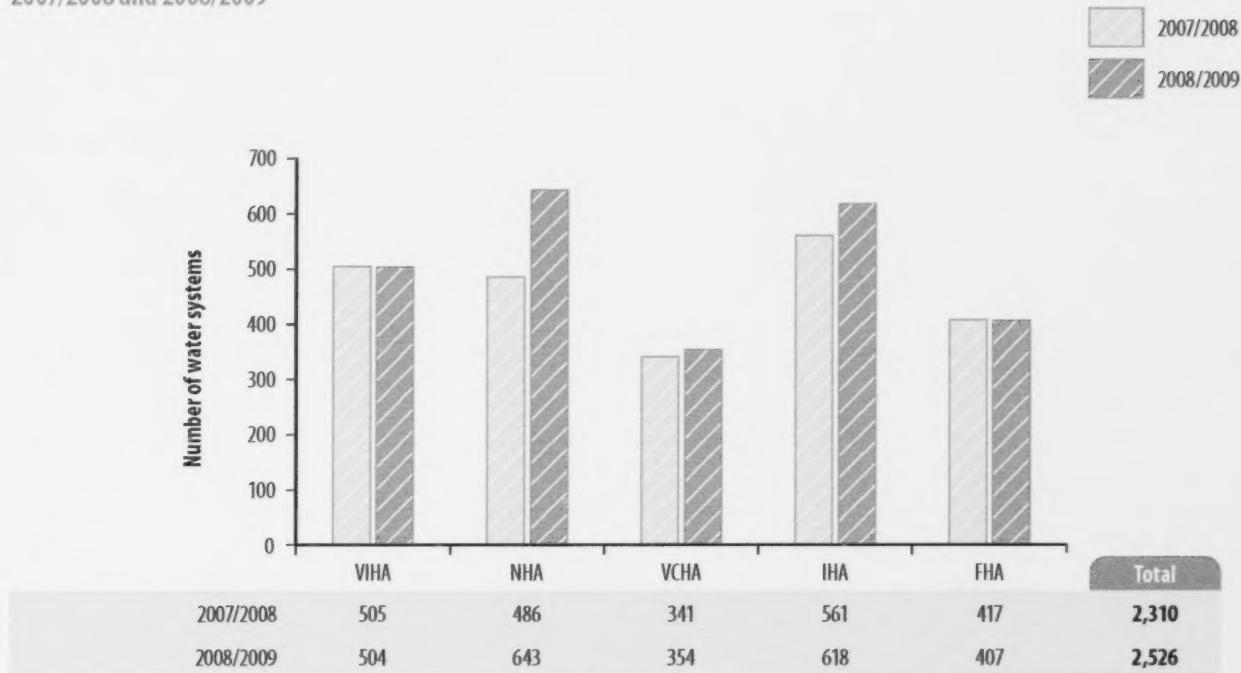
In 2007/2008, 2,310 drinking water systems inspections were conducted. This number increased to 2,526 in 2008/2009, for a total of 4,836 inspections over the reporting period. By the end of 2008/2009, the number of systems with a hazard rating had increased from approximately 3,500 systems at the end of 2007 to a total of 4,077. Figure 8 shows the numbers of inspections by health authority.

As previously reported, different hazard rating systems are used in different health authorities. In some cases, hazard ratings are based on the results of the above inspections; in others, they are based on known, inherent risks associated with a system.

Regardless of the approach used to assign a hazard rating, the results are used to prioritize activities by drinking water officers and water suppliers to make improvements to water supply systems. In general, drinking water officers prioritize their activities to address the highest hazard water systems, particularly where they serve larger populations. Water suppliers are asked or directed to place a higher priority on addressing those aspects of their water supply that contribute to a higher hazard rating, while recognizing that it is imperative to continue to maintain the existing strengths of a water supply system.

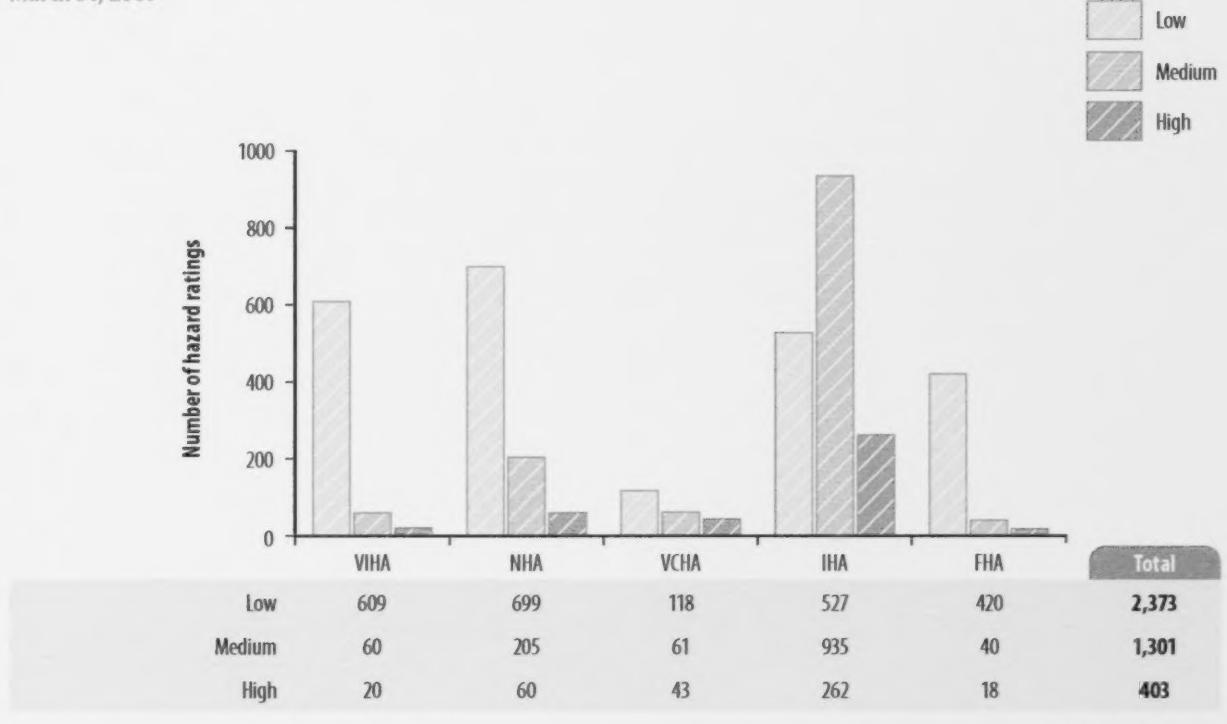
The numbers of low, medium and high hazard ratings in each health authority are given in Figure 9.

Figure 8: Number of drinking water systems inspected, by health authority, 2007/2008 and 2008/2009



Source: Health Authorities

Figure 9: Hazard ratings for drinking water systems, by health authority, March 31, 2009



Source: Health Authorities

Features of water supply systems that commonly contribute to higher hazard ratings include a lack of proper treatment of surface water, presence of *E. coli* in the distribution system, lack of an emergency response plan and inadequate training of the operator. Where a water supply system has been required to issue a boil water notice, it will automatically be rated as a high hazard system.

In First Nations communities, Health Canada's First Nations and Inuit Health Environmental Health Services program has established a routine process of undertaking assessments of all water supply systems on reserve. Comprehensive assessments are undertaken on a five-year rotating period; assessments were underway during the reporting period, with publication of results expected in 2011.¹¹ These assessments are undertaken in addition to routine inspections and oversight of water supplies by Bands, Indian and Northern Affairs Canada and Health Canada. Results of the previous National Assessment of Water and Wastewater Systems in First Nations Communities are available online at wwwainc-inacgcenr/wtr/pubs/watw/watw-eng.asp.

¹¹ Results of the assessments were released in July 2011 and are available at wwwainc-inacgcenr/wtr/nawus/index-eng.asp.



Section 5. Water Treatment and Distribution

Water treatment and distribution are at the heart of providing clean, safe and reliable drinking water to consumers. Without proper treatment and distribution system operation, public health is at risk.

In BC, all public drinking water supplies collected from surface water sources such as lakes and rivers must be disinfected. Similarly, where a drinking water officer believes that a groundwater source is at risk of containing pathogens (generally due to influence from surface water), the water supplier must provide disinfection. Many sources, particularly surface water sources, may also require filtration before water is safe to drink. Available data for 2007 documented 900 drinking water systems in the province disinfecting their water, with just over 400 of these systems also providing filtration. With improved data availability, particularly from Interior Health Authority, and treatment improvements, these numbers had increased to 1,810 systems disinfecting and 519 filtering by March 31, 2008. By March 31, 2009, these numbers had increased to 1,968 systems disinfecting their water and 675 providing filtration. By March 31, 2009, over 237,000 people in British Columbia were receiving filtered surface water.¹² While more water suppliers need to add filtration

to their water treatment, many of the unfiltered sources can be adequately treated with a combination of ultraviolet disinfection and chlorination, as is the case with over 300,000 people served by the Capital Regional District Integrated Water Services.

Systems serving more than 500 people must be run by operators certified by the Environmental Operators Certification Program and by other qualified professionals. Systems serving fewer than 500 people do not have legislated certification requirements but may have conditions placed on their operating permit requiring specific qualification of operators, including certification. While the number of certified operators in the province has risen from 1,400 to 1,600 in recent years, more work needs to be done to ensure that all water systems are operated by appropriately qualified people. Likewise with the number of water systems that have been classified by the Environmental Operators Certification Program based on their size and level of complexity; while over a thousand systems have been classified, nearly three times as many have not. Classification of systems and operator certification go hand in hand.

Since 2006/2007 significant progress has been made in ensuring that water systems have valid operating permits, with

¹² Metro Vancouver subsequently commissioned their new Seymour Capilano filtration plant and have been providing a mix of both filtered and unfiltered water since December 2009.

an increase in permitted systems of over 200 to a total of 4,539 permitted systems in March 2009. Moreover, the number of systems with conditions on their operating permits increased by more than 400 to 1,195 in March 2009. Similarly, the number of systems with an emergency response plan increased from under 1,500 in 2007 to over 2,500 in 2009. To a certain extent these improvements reflect improved data collection rather than improvements to system operation, but the changes are encouraging.

As discussed in the previous report, the province's physical drinking water infrastructure is aging and much of it needs to be upgraded or replaced. Infrastructure funding programs are working to improve this situation. Over the reporting period, the combined Towns for Tomorrow and Building Canada Fund committed over \$100 million towards \$159 million worth of drinking water-related infrastructure improvements and over \$925,000 toward planning for water supply improvements.

During the reporting period, the number of construction permits issued across the province increased significantly, from 883 in 2006/2007 to 1,008 in 2008/2009. These construction permits were issued for improvements and extensions to existing drinking water systems as well as for new systems or treatment facilities for new water sources.

The sections that follow describe these programs and issues in greater detail.

5.1 Effective Strategies

No changes were made to provincial regulations respecting water treatment or distribution systems during the reporting period. Requirements remain in effect to disinfect surface water or groundwater at risk of containing pathogens, to function under appropriate permits, to comply with conditions on permits and to meet minimum bacteriological sampling frequency and results.

5.2 Aligned Management Systems

Construction Permits

Health authorities issued significantly more construction permits annually over the reporting period than the 883 permits issued in 2006/2007. In 2007/2008 a total of 1,007 permits were issued, in 2008/2009 1,008 permits were issued. Table 4 shows the breakdown of permits issued by health authority. The number of permits issued in Interior Health Authority is lower than historical levels due to the increased complexity of construction permit applications related to the higher degree of complexity in treatment now being proposed by water suppliers.

Conditions may be attached to construction permits. In some cases, a phased approach to construction may be agreed upon by the drinking water officer and the water supplier. When construction permits are issued for the significant expansion of drinking water systems that do not meet the current drinking water treatment objectives, conditions are included on the permit requiring system improvements to be made

Table 4: Number of construction permits issued by health authority, 2007/2008 and 2008/2009

Health Authority	Improvements		Extensions		New Systems		Total Permits	
	2007/2008	2008/2009	2007/2008	2008/2009	2007/2008	2008/2009	2007/2008	2008/2009
Vancouver Island*	—	—	—	—	—	1	322	287
Northern	19	21	31	23	14	12	62	106
Vancouver Coastal	17	9	33	24	11	5	55	88
Interior**	—	—	—	—	—	24	416	423
Fraser	17	6	49	12	4	86	152	104

Note: “—” means no data provided.

Source: Health Authorities

* Breakdown not differentiated.

** New systems reported are new water sources, but may apply to existing systems.

according to timetables agreed upon by water suppliers and the drinking water officer.

When reviewing construction permit applications, issuing officials (public health engineers) may find deficiencies in the application, such as incomplete specifications, cross-connections between treated and non-treated water and inadequate levels of treatment. The process for responding to these deficiencies varies between issuing officials and specific applications. In some cases, the application is formally rejected, while in others the application is returned with requests for changes or additional information. Details on the amount of time issuing officials spend reviewing inadequate applications is not available; however, the number of applications reported as rejected during the reporting period was 166 (2007/2008) and 149 (2008/2009).

Facility Classifications

As of April 15, 2009, the Environmental Operators Certification Program (EOCP) had classified a total of 1,157 drinking water facilities in BC. This number is up from 970 in April 2008 and 421 in 2004, with the biggest increase in the number of classified small water systems. During the reporting period, the number of classified small water systems increased by 168.

Even though water treatment facilities are classified separately from water distribution systems, they are almost always associated with a distribution system. Consequently, the total number of water supply systems that have been classified is closer to 1,061, with 96 systems having both their treatment facility and distribution system classified.

Classifications are broken down by complexity of water system, from I (the least complex) to IV (the most complex). A small water system designation is used for facilities serving up to 500 people. Table 5 shows the breakdown of facility classifications, by level.

As mentioned, the number of classified facilities has progressively increased since 2004, the end of the first year in which classification and operator certification was required under the *Drinking Water Protection Act*. The number of classified water treatment facilities has risen from 56 to 96 (with increases at each level). The number of classified water distribution systems, including small water systems, has increased from 365 to 1,061.

Given that there are more than 4,500 drinking water systems in the province, the vast majority of water systems, especially small water systems, remain unclassified. However, drinking water officers recognise that systems serving fewer than 500 people that do not have filtration or other complicated treatment meet the small system criteria of the EOCP and treat them accordingly. Most of the BC population is served by water systems that have been classified and have appropriately certified operators and professional staff.

For more information on the classification process for facilities, see the EOCP website at www.eocp.org.

Operating Permits

Operating permits are issued to drinking water system owners by drinking water officers. The numbers of systems operating with and without operating permits are listed in Table 6, along with the number of systems operating with conditions on their permits.

The total count of systems with operating permits is dominated by over 3,300 small systems, with only an estimated 1,220 systems serving more than 15 connections. The data on the smaller systems are often inaccurate, with systems that no longer exist still listed in a database or with out-of-date information. Furthermore, it is generally recognised that there are many small systems that meet the regulatory definition of a water supply system, which remain unknown to drinking water officers and therefore operate with no regulatory oversight.

Table 5: Facility classifications, by complexity level, as of April 15, 2009

Type of System	Classification Level					Small Water System	Total
	IV	III	II	I			
Water Distribution	32	44	139	141		705	1,061
Water Treatment	15	24	47	10		not applicable	96
Total	47	68	186	151		705	1,157

Source: Environmental Operators Certification Program

Table 6: Numbers of water systems with operating permits, without operating permits, and with conditions on their permits, by health authority, 2007/2008 and 2008/2009

Health Authority	Number of Systems with Operating Permit		Number of Systems without Operating Permit		Number of Systems with Conditions on their Operating Permits	
	2007/2008	2008/2009	2007/2008	2008/2009	2007/2008	2008/2009
Vancouver Island	876	744	42	54	17	27
Northern	1,118	1,114	0	0	988	672
Vancouver Coastal	279	279	34	82	238	238
Interior	1,796	1,822	32	31	184	160
Fraser	470	478	0	0	64	98
Total	4,539	4,437	108	167	1,491	1,195

Source: Health Authorities

Much of the difference between the number of systems with and without operating permits between the two years in this reporting period, particularly where the number has decreased, reflects improvements in data tracking (e.g., in Vancouver Island Health Authority). For example, many systems have been entered into a data system more than once when they are associated with a business that has changed ownership or name.

Emergency Response Plans

Significant increases in the number of documented emergency response plans were reported in both 2007/2008 and 2008/2009. The increases reflect, in part, improved data, but also the completion of emergency response and contingency plans by water suppliers. The number of documented emergency response plans increased by almost 1,000 over

the course of the reporting period, from approximately 1,500 in March 2007 to 2,545 by March 2009.

Of the 1,756 water systems with no emergency response plan in place, the majority serve fewer than 300 connections. Table 7 shows the breakdown by health authority.

Operator Training

Many institutions and organizations provide training for drinking water operators. In BC, the list includes the BC Water & Waste Association, the Water Supply Association of BC, the Small Water Users Association of BC, the British Columbia Institute of Technology, Thompson Rivers University, Simon Fraser University, the University of British Columbia, and correspondence courses through American institutions such as California State University at Sacramento.

Table 7: Number of systems with and without emergency response and contingency plans, by health authority, 2007/2008 and 2008/2009

Health Authority	Number of systems with current emergency or contingency plan		Number of systems with no emergency or contingency plan	
	2007/2008	2008/2009	2007/2008	2008/2009
Vancouver Island	341	575	690	235
Northern	473	524	657	583
Vancouver Coastal	115	115	72	72
Interior	810	864	880	855
Fraser	427	467	43	11
Total	2,166	2,545	2,342	1,756

Source: Health Authorities

A wide range of private-sector companies, such as equipment suppliers, also offer training that is recognized for the purposes of certification. Water suppliers can also conduct in-house training that counts toward certification if the EOCP assigns education credits to the training program. A list of training courses that the EOCP has accepted is available at www2.eocpsearch.org/TrainingRegistry/index.php. The EOCP maintains an online form for trainers to submit their course information to have education credits assigned to it.

BC Water & Waste Association

The BC Water & Waste Association (BCWWA) is the largest provider of water operation courses in the province. It is a non-profit association of water and wastewater system professionals with a mandate to provide training opportunities for people working in these industries.

The BCWWA holds one- to five-day training courses on a wide variety of water and wastewater system issues. Courses include water treatment (Levels I and II), water distribution (Levels I, II and III), wastewater collection (Levels I, II and III), wastewater treatment (Levels I, II, III/IV), chlorine handling, water sampling, water quality for distribution operators, dam inspection and maintenance, leak detection, confined space awareness, shoring and utilities location awareness, unidirectional flushing, and small water and wastewater systems. For more information on BCWWA's course offerings, see www.bcwwa.org.

The BCWWA reports on a calendar year. In 2007, they held 90 courses attended by a total of 1,381 operators. In 2008, 102 courses attracted 1,414 operators, and in 2009, 1,079 operators attended 85 courses.¹³

Water Supply Association of BC

In the spring and fall, the Water Supply Association of BC holds workshops for waterworks managers, administrative staff and waterworks operators. The association liaises with the EOCP to assess and meet training, certification and classification needs in the province. It also works with the BCWWA and the Small Water Users Association of BC.

Operator Certification

Drinking water treatment and distribution system operators are certified by the EOCP, an independent certification body. Operators who wish to become certified must meet the minimum educational and work experience requirements for the level of complexity of the system they are working on, and must pass certification exams.

The number of certified drinking water operators in the province increased steadily over the past decade until the final year of the reporting period. The number of certified water distribution operators peaked in 2008 at 2,928, then declined slightly to 2,728 by April 2009, which is comparable to the total number of certified operators in April 2007. The number of certified water treatment operators rose from 237 to 322 between 2007 and 2009. By April 2009, 1,094 operators were certified to run small water systems, a slight decline from the 1,159 certified small system operators in February 2007. These numbers are further broken down by certification level in Table 8. Certification levels are set to match the complexity of the water system (see sub-section on facility classifications earlier in this section). The declining number of certified operators reflects a combination of retirement and operators simply not renewing their certification.

Table 8: Number of certified operators in BC, by certification level, April 2008 and April 2009

Type of System	Certification Level											
	IV		III		II		I		Small Water System		Total	
2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008
Water Distribution	19	22	135	118	724	684	850	810	1,200	1,094	2,928	2,728
Water Treatment	13	14	14	18	118	99	177	191	N/A	N/A	322	322

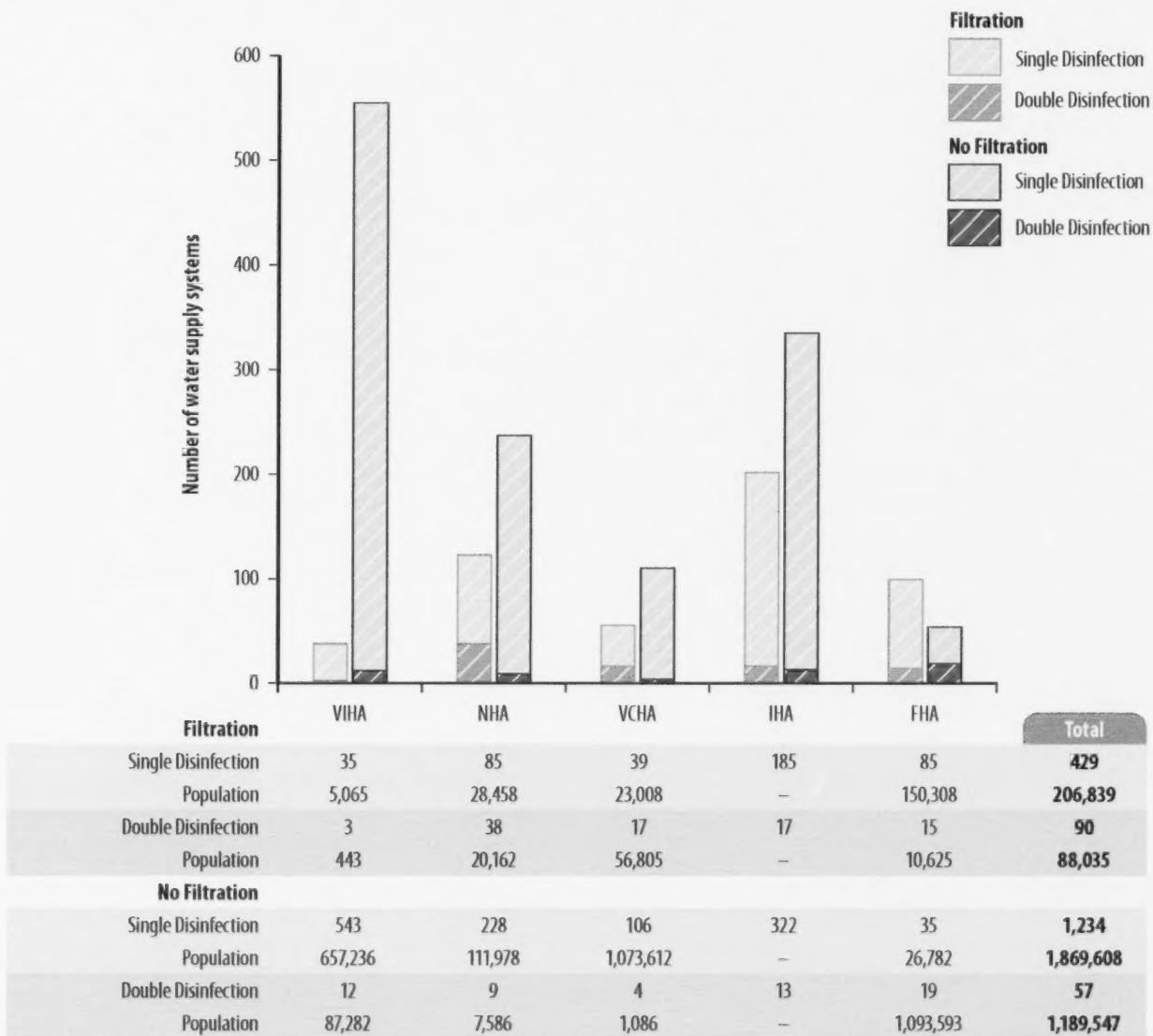
Note: As of October 31, 2011, the Ministry of Health and the EOCP are reviewing the needed qualifications of operators of large systems.

Source: Environmental Operators Certification Program

¹³ Some operators are counted multiple times if they took more than one course during the year.

As mentioned in previous reports, managers of some larger water distribution systems, classified as Class III or IV systems, have questioned the need to have their operations overseen by a Level III or IV operator. These systems generally have extensive expertise available within their water department from professional staff such as engineers, accountants, technicians and technologists. These people do not qualify for operator certification, but may be able to oversee distribution system operation and administration.

Figure 10: Number of water supply systems and population served using different levels of treatment, by health authority, as of March 31, 2008



5.3 Performance Measurement and Reporting

Treatment of Drinking Water Supplies

Water supplies from a surface water source, or a groundwater source under the influence of surface water, must be treated. Because these sources are at risk of containing pathogens, the minimum treatment required is disinfection. If the source water is subject to turbidity, then filtration may also be required to remove pathogens and to ensure that disinfection is effective, and to minimize the formation of chemical

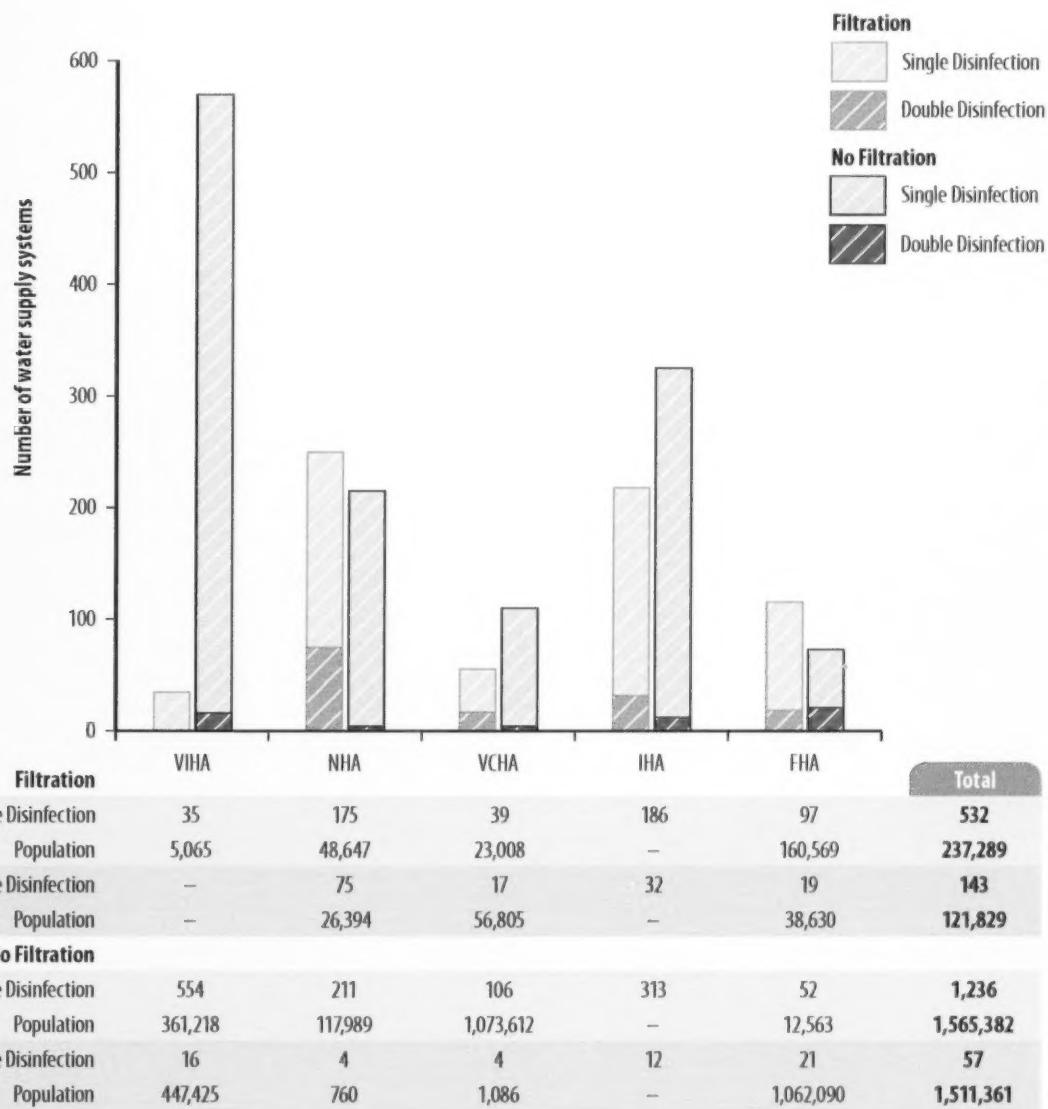
Source: Health Authorities

by-products of chlorination, some of which have been linked to an increase in long-term risk of some types of cancer.

Since the previous reporting period, health authority data systems have been improved and more information is available on the levels of treatment in place across the province. Figures 10 and 11 show the number of water systems (filtered, not filtered and receiving single or double disinfection) and the populations served, by health authority, for 2008 and 2009. Data are shown as of March 31st of each year.

Figure 11: Number of water supply systems and population served using different levels of treatment, by health authority, as of March 31, 2009

Data are still incomplete, but do generally reflect the level of water treatment provided to over 75 per cent of the population. Data have been collected in different manners across the province, and it is not always possible to clearly link population data to type of treatment, particularly where communities have several water sources that receive different levels of treatment and that are used on a seasonal basis. One significant gap in these data is that populations receiving groundwater that does not need treatment are not clearly identified.



Source: Health Authorities

While most surface water requires filtration to meet current water quality expectations, there are many sources that can effectively be treated through a combination of ultraviolet irradiation and chlorination. An example of this latter category is the water source used by the Capital Regional District.

In 2007, just over 400 systems filtered their drinking water; by 2008, that number had increased to almost 519, and by 2009, the number had increased to 675. The total population receiving filtered water increased by approximately 64,900 between 2008 and 2009. In total, a reported 1,234 drinking water systems in the province are treated with at least disinfection.

Infrastructure Improvement and Planning Grant Programs
Over 2007/2008 and 2008/2009, the Ministry of Community and Rural Development delivered three programs to help water suppliers fund improvements to their water supply systems. These programs are available to local governments, including municipalities and regional districts. The programs, which are jointly funded by the provincial and federal

governments, include infrastructure assistance through Canada/BC Towns for Tomorrow and the Building Canada Fund, as well as Planning Grants.

Under Towns for Tomorrow and the Building Canada Fund, local governments are eligible for as much as two-thirds of the total cost of an infrastructure project. In 2007/2008, \$44 million was awarded to 38 projects, with local government contributing the remainder of the \$69 million total cost. In 2008/2009, a further \$55 million was contributed through infrastructure grants to a total of \$84 million of infrastructure improvements.

The province also provides grants of up to \$10,000 to local governments to engage in planning projects related to a variety of water system needs, including infrastructure improvement, governance, well protection, water conservation and risk assessment. In 2007/2008, \$500,950 was awarded to 54 water-related projects. In 2008/2009 47 water-related projects were funded at a total contribution of \$434,380.

West Vancouver Implements Membrane Water Treatment
In 2009, the District of West Vancouver initiated operation of the Eagle Lake membrane treatment facility. This new facility provides up to 21 million litres per day of ultrafiltered drinking water to district residents, exceeding all drinking water guidelines currently in place. Historically, only chlorination was used for treatment and no protection for turbidity, protozoa or colour was provided.

Planning for this facility was initiated over 10 years ago. The district's consulting engineering firm recommended membrane treatment in order to address colour and suspended solids (turbidity) present in Eagle Lake. Membrane treatment also filters many of the larger waterborne parasites from the water, reducing the amount of chlorination needed. The membranes have a nominal pore size of 0.02 micrometer (a micrometer is one millionth of a meter) and an absolute pore size of 0.1 micrometer. Water is filtered through approximately 13 million membrane fibres, with a total filtration surface area of approximately 18,000 m². To put these measurements into context, human hair has a diameter ranging from 20 to 180 micrometers, and a football field has a surface area of approximately 5,980 m².

The complete treatment system involves multiple intake screens in the lake to maximize the raw water quality, a 1 mm mechanical band screen, coagulation/flocculation, membrane filtration, chlorination, pH adjustment and corrosion control prior to distribution of the water within the district's distribution system.

In order to comply with the district's water conservation strategy, the water treatment plant treats the waste water from the membrane system with a secondary treatment system. The Eagle Lake facility will waste less than 1 per cent of the water entering the treatment plant.

The plant is now producing water with a filtered turbidity of less than 0.05 NTU and is consistently providing a log reduction values for protozoa between 4 and 5-log (99.99 per cent to 99.999 per cent removal).

A more detailed article on the Eagle Lake Membrane treatment plant project is available in the BC Water & Waste Association's Spring 2009 edition of Watermark Magazine, available at www.waterbucket.ca/wcp/?sid=22&id=595&type=single.



Section 6. Drinking Water Quality

Drinking water quality is measured through programs that monitor treatment effectiveness and treated water quality.

Samples of drinking water are taken at the treatment plant and in the distribution system and then are sent to laboratories for testing and analysis. Some tests are conducted on-site, such as chlorine analysis and, in many cases, water suppliers have installed online monitoring instruments that can continuously monitor parameters such as turbidity. Most chemical analyses are conducted in laboratories, as are most microbiological tests. In excess of 100,000 microbiological tests are conducted on BC water supplies each year, and during the reporting period, at least 1,121 samples were tested for a range of chemicals such as metals, nitrates, fluoride and disinfection by-products such as trihalomethanes.

When bacterial standards are not met, the reason for this will be investigated. Occasionally standards may not be met as a result of contamination during the sampling process, but if there is evidence that the community being supplied by the water system is at risk of exposure to a waterborne pathogen, public notice will be made advising people to take additional precautions with their drinking water. Where levels of chemical contaminants exceed the maximum acceptable concentrations set out in the Guidelines for Canadian Drinking Water Quality, drinking water officers discuss the results with the water supplier and may require the public to be notified of any potential health risks. Drinking water officers may also require steps to be taken to improve water quality through treatment or upgrading of wells or by obtaining a new water source.

6.1 Effective Strategies

Legislation

No amendments related to water quality monitoring were made to the Drinking Water Protection Regulation during the reporting period. The regulation continues to require water suppliers to monitor their drinking water for *E. coli* and total coliform bacteria and provides the opportunity for drinking water officers to establish chemical monitoring programs through conditions on operating permits.

6.2 Aligned Management Systems

Training Courses for Water Sampling

The BCWWA offered courses on water sampling during the reporting period. Additionally, all laboratories offering testing services will also provide guidance to people who are collecting samples. An example of information provided by laboratories is available from the BC Centre for Disease Control at www.bccdc.ca/NR/rdonlyres/0DDE1063-FC56-4109-8D2D-IC9C9CA2DCFA/0/Watersamplingwithborder050930.pdf.

Laboratory Services

As was discussed in Section 1.3, the Provincial Health Officer approves laboratories to carry out testing under the *Drinking Water Protection Act*. The Provincial Health Officer is supported in this role by the Enhanced Water Quality Assurance Program.

6.3 Performance Measurement and Reporting

Bacteriological Sampling and Analysis

Health Authorities

The Drinking Water Protection Regulation requires water suppliers to take samples of their water supply for bacteriological testing and analysis by Provincial Health Officer-approved laboratories. In 2007/2008 and 2008/2009, 931 and 1,298 systems respectively are reported to have met the bacteriological sampling frequency requirements set out in the regulation or on their operating permit. Table 9 shows the number of systems meeting these requirements, by health authority.

Data were not available from the Interior Health Authority due to the way it manages microbiological data. The *Drinking Water Protection Act* requires water suppliers to undertake their own monitoring, but only requires that positive results for *E. coli* or fecal coliforms be reported to the drinking water officer. Drinking water officers can require laboratories or water suppliers to provide them with all data, but for larger water suppliers the Interior Health Authority does not require them to provide all of their microbiological data; as a result, the health authority cannot definitively provide a summary of systems meeting sampling frequency requirements. In the other four regional health authorities, 1,400 and 1,700 water supply systems did not meet sampling frequency requirements in the two years of the reporting period.

Table 9: Number of water systems meeting bacteriological sampling frequency, collecting general water chemistry samples and sampling for specific chemical parameters, by health authority, 2007/2008 and 2008/2009

Health Authority	Number of Systems Meeting Bacteriological Sampling Frequency		Number of Systems Undertaking General Chemical Sampling		Number of Systems Undertaking Routine Sampling for Specific Chemicals	
	2007/2008	2008/2009	2007/2008	2008/2009	2007/2008	2008/2009
Vancouver Island	158	171	—	101	—*	11
Northern	243	589	147	325	78	18
Vancouver Coastal	89	89	60	60	13	13
Interior	—*	—*	86	141	16	0
Fraser	441	449	89	112	8	21
Total	—*	—*	—*	739	—*	63

*Information was not available from Interior Health Authority and Vancouver Island Health Authority — water sampling is the responsibility of the water supplier and not all data are entered into the health authority's data management system.

Source: Health Authorities

The reasons for not meeting the sampling frequency requirements vary. For example, in the Northern Health Authority, getting samples to a laboratory from isolated sampling sites can take a long time, and if a sample arrives at a laboratory more than 30 hours after collection it will not be analysed. Ensuring timely transportation can be difficult and may be affected by adverse weather conditions; for example, in extreme cold weather samples may freeze in transit, resulting in a supplier not meeting their testing frequency requirement (even though they may have collected the appropriate number of samples). In 2007/2008 and 2008/2009, the BC Centre for Disease Control Laboratory reported that 971 and 1,051 samples respectively were “wasted” as a result of being too long in transit, frozen on receipt or otherwise unacceptable for analysis. This represents approximately 1.5 per cent of all samples, which is slightly higher than the percentage reported in 2006/2007, but well below levels reported in previous years. Failing to meet sampling frequency is generally not a significant threat to oversight of water quality if only a few samples are missed over the year. It is worth noting, however, that significant increases in the number of compliant systems

have been made since the previous reporting period, when only 824 systems met sampling frequency expectations.

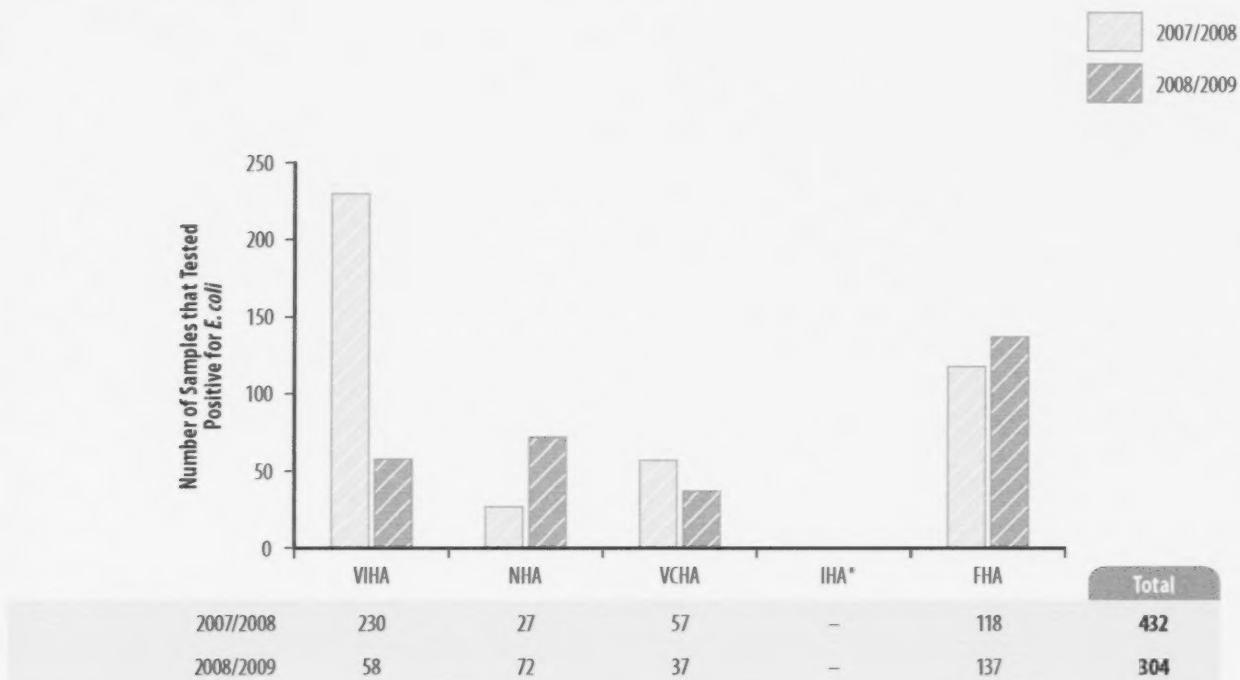
In 2006/2007, four of the five regional health authorities reported that a combined 280 samples were contaminated with *E. coli* bacteria. This number increased to 432 in 2007/2008, then decreased to 304 in 2008/2009 (see Figure 12).

The Interior Health Authority is still not able to report on the number of positive sample results reported to drinking water officers.

It is not possible to determine exactly why the number of positive samples has increased from previous years; however, it may reflect increased efforts to sample smaller systems, which often lack proper treatment of their source water. For samples tested at the BC Centre for Disease Control Laboratory, 232 tested positive for *E. coli* in 2007/2008 and 179 tested positive in 2008/2009. This equates to approximately 0.3 per cent of all samples testing positive.

The reporting of positive samples was done under the Drinking Water Protection Regulation’s “immediate reporting

Figure 12: Number of positive bacteriological samples, by health authority, 2007/2008 and 2008/2009



* – Data not available

Source: Health Authorities

requirement”, which allows rapid follow-up by water suppliers and drinking water officers. The BC Centre for Disease Control Laboratory made 896 and 537 telephone calls under this requirement in 2007/2008 and 2008/2009 respectively. Follow-up by drinking water officers and water suppliers includes resampling, checking other water quality monitoring and treatment performance results, issuing public advisories or notices, and fixing any identified problems.

BC Centre for Disease Control Laboratory Services and Approved Laboratories under Contract to the Centre
During 2007/2008 and 2008/2009, the BC Centre for Disease Control Laboratory Services spent more than \$1 million per year testing drinking water samples for bacteria. They tested between 5,000 to 7,000 samples per month, for a total of 67,781 samples in 2008/2009 and 67,865 samples in 2007/2008. Additionally, the BCCDC has contracts with three Provincial Health Officer-approved laboratories, which test an additional 12,000 to 15,000 samples per year. In the two years of the reporting period, laboratories under contract to the BCCDC tested 13,391 and 13,313 samples respectively. The total number of samples tested at other approved laboratories not affiliated with the BCCDC, are unknown but significant. Water suppliers are required to undertake monitoring at their own cost and larger systems are doing this. Both MetroVancouver and the Capital Regional District operate their own laboratories, with the MetroVancouver laboratory testing over 20,000 samples per year. Other suppliers contract with Provincial Health Officer-approved laboratories.

Sampling for Chemical and Physical Parameters

The number of Health Authority report water systems undertaking general chemical sampling increased significantly from 2007/2008 to 2008/2009. This likely reflects improvements in tracking water chemistry data rather than an increase in actual testing. This broad spectrum sampling generally looks for a range of naturally occurring metals, anions and pH.

An additional 115 systems were conducting regular testing for specific chemicals of concern within the distribution system in 2007/2008. The reported number of systems monitoring for specific chemicals in 2008/2009 dropped to 63. This type of monitoring is undertaken in response to concerns identified in the broad spectrum monitoring programs or

because of treatment considerations. The chemicals most commonly tested for on a more frequent basis include arsenic, uranium (both of which are naturally occurring in source waters), nitrates (associated with fertilizers, agricultural waste and sewage contamination), fluoride (naturally occurring and an additive to protect against dental cavities) and trihalomethanes (a by-product of disinfecting with chlorine). Table 9 shows the number of systems in the province reported to have undertaken chemical sampling in 2007/2008 and 2008/2009, by health authority.

Water chemistry data have not been readily available from health authority databases, making it difficult to report whether sampling has been undertaken, for which parameters, and what the results were. Some progress has been made in this area and some health authorities are now posting water chemistry data on their websites.

Information about water chemistry can be obtained directly from a water supplier upon request, or from the supplier's annual report or website, where applicable.



Section 7. Small Systems

Ensuring people in small communities have access to high quality drinking water has long been a challenge in BC. Since December 2005, small systems have been defined in the Drinking Water Protection Regulation as those serving fewer than 500 people per day. Amendments to the regulation at that time gave small systems greater flexibility with respect to operator qualifications and for choosing point-of-use and point-of-entry treatment devices as a way of treating drinking water in very small communities.

Data on system size is usually collected by the health authorities based on the number of connections¹⁴ they serve. This reflects the fact that water systems that serve more than 14 connections are required to pay an annual fee under the Drinking Water Protection Regulation, and data systems were designed to accommodate a billing function. The categories recorded include 1–14 connections, 15–300 connections and more than 300 connections. While there is no absolute correlation between the number of connections and the population served, it is generally clear that systems serving fewer than 15 connections will serve fewer than 500 people per day. The most common exception to this generalization is for systems that serve public facilities,

such as parks. Table 10 provides a breakdown of these three categories.

Table 10: Number of water systems, by number of connections served, as of March 31, 2009

Number of Connections	Number of Systems
more than 300	225
15–300	997
1–14	3,328
Total	4,550

Source: Health Authorities

Most of the challenges that small systems face extend to systems that serve more than 300 connections, and it is clear from Table 17 that the majority of water supply systems in the province are small, regardless of what definition of small is used.

Small water supply systems often lack adequate funding because of their small revenue base and because costs of treating drinking water are not proportionate to population size. In many cases, people served by the system are reluctant or opposed to the rate increases that would fully finance necessary infrastructure upgrades and proper operation.

¹⁴ Service connections include any property served by a water supply system, and may be private homes, apartments, public buildings, parks, etc.

Large urban communities can realize cost savings because they operate on a much larger scale and can generally access financial assistance from federal and provincial grant programs. Water supply systems not owned by local governments have to finance all infrastructure improvements through their water rates, unless they are able and willing to access resources through local governments. This option may require a transfer of ownership of the water system to the local government. Such transfers of ownership are often seen as undesirable to the community due to potential rate increases or loss of autonomy. Conversely, local governments, such as regional districts, may see them as undesirable acquisitions because they will then own a water supply system that does not meet regulatory requirements, posing a liability to the local government.

Over the past several years, the provincial government, health authorities, water supply associations and others have put considerable effort into understanding the challenges facing small systems and developing new support mechanisms. These include programs for small community water systems that deal with networked monitoring solutions, group loans and access to liability insurance; publications related to capacity building, sustainable operations and pricing; studies and surveys of the management of small water systems and the use of point-of-use and point-of-entry water treatment devices; and courses and training opportunities for operators of small water systems.

7.1 Effective Strategies

Amendments to the Drinking Water Protection Regulation
 The provincial government amended the Drinking Water Protection Regulation in 2008 to exclude strata corporation systems from the definition of a domestic water system. The rationale behind the amendment was to reduce a regulatory burden with little benefit to the people served by those systems. Most strata corporation systems are very small, with little in the way of infrastructure, and are provided with potable water by another supplier. In addition to simplifying the process of developing strata systems by removing the need for construction and operation approval, the amendment removes the need for drinking water officers to dedicate their efforts to systems that are, in effect, single buildings connected to approved supplies.

7.2 Aligned Management Systems

Transfer of Ownership to Local Government

Most regional districts are willing to provide assistance to small water supply systems or to take ownership of systems and operate them. Transfer of ownership is contingent upon a number of criteria. Generally speaking, local governments will only take ownership of a water supply system at the request of the owner, with endorsement by the community served by the supply, and only where there is a fully compliant water system or clear plans to achieve regulatory compliance in a reasonable time frame. In some cases, regional districts have formal acquisition strategies. The Columbia Shuswap Regional District finalised an acquisition strategy in February 2009. It is posted at www.csrdb.ca/siteengine/activepage.asp?PageID=73.

Before a regional district will take over a small water supply system, it is generally necessary to undertake an assessment of the system's needs and develop plans to improve infrastructure to the point where it meets *Drinking Water Protection Act* requirements. This work needs to be undertaken by the small system, which often lacks the capacity to finance the work. Regional districts can apply for funding on behalf of a small water supply system to undertake planning for system upgrades, and approximately 10 study grants are awarded each year for systems not owned by the local government. Planning grants are limited to a maximum provincial contribution of \$10,000.

Details are not available on how many systems have been transferred to local government; however, it does not appear to be a frequent occurrence. Many owners refuse to consider the option, perceiving a value in the infrastructure they own and expecting compensation from the local government. For their part, the local government may perceive the system as a liability, both in terms of the finances needed to upgrade infrastructure as well as long-term operation costs. The final barrier to transfer of ownership is that the people served by the system must agree to the formation of a local service area, which will allow the local government to recoup any costs associated with the system from those people, rather than the larger community. Despite the fact that any needed improvements will now qualify for infrastructure assistance from provincial/federal programs, users may be opposed to any rate increases necessary to meet acceptable infrastructure and water quality standards or they may wish to retain local autonomy, and therefore reject formation of a local service area.

Group Liability Insurance

A Group Liability Insurance Program for small community water suppliers, developed by the Sustainable Infrastructure Society in collaboration with industry partners and the Ministry of Health Services, continued to provide affordable insurance to small water system owners. During the reporting period, the program was expanded and now includes property insurance, directors and officers insurance, and boiler and machinery insurance. Small system owners continue to realise annual insurance cost savings of \$2,000 to in excess of \$10,000. Information about the society, and access to its programs and support, are available through its website at www.WaterBC.ca.

Asset Management and Rate Setting

One of the prime challenges facing small water systems is the deterioration of system infrastructure. All components of a water supply system have a natural lifespan that ranges from months to decades. Filters may need to be replaced within several months, ultraviolet irradiation tubes may need to be replaced annually, and pipes, storage reservoirs and pumps will last for decades, but all will need replacement or significant repairs at some point. An asset management plan allows system owners to systematically manage assets, and schedule replacement or rehabilitation before it becomes a problem. In turn, the plan enables owners to predict financing needs well into the future, and set water rates accordingly. Working with industry partners, the Sustainable Infrastructure Society has developed a program to assist small system owners to develop asset management programs and establish appropriate water rates. A key resource for communities throughout the Province is Asset Management BC, information and tools are available through its website at www.assetmanagementbc.ca.

Water System Mapping

In support of the asset management program, the Sustainable Infrastructure Society has also been working to develop a water system mapping program. This program assists water suppliers to develop a plan of the service area, showing the position of pipes, reservoirs and other components of the water system, and assists suppliers to develop their asset management program. Mapping system components can be an expensive process, and the society has been working to assist suppliers to develop affordable scale plans of their systems. The process involves using recent developments in

computer and mapping tools, including GIS technology, to manage costs and make full use of the knowledge the owner has of their water system.

Point-of-Entry Water Treatment

Point-of-entry water treatment may be the most cost-effective approach for some small water supply systems to meet their treatment needs. Considerable effort has been taken to provide small system owners with guidance on developing a point-of-entry treatment approach, and several have managed to achieve an acceptable approach over the reporting period. Information to assist suppliers to develop a point-of-entry treatment approach is available from the Sustainable Infrastructure Society at www.WaterBC.ca.

Access to Loans

The Sustainable Infrastructure Society has also been working with credit unions to arrange an Access to Loans program for community water suppliers. Historically, lending institutions have been reluctant to finance private water treatment systems, since there is no tangible asset against which to secure the loan. Since suppliers often lack sufficient reserve funds, it is necessary to raise rates prior to commencing any system upgrades, which can be a concern for rate payers. As of October 31, 2009, a loan program has not been developed.

Networked Monitoring

Large suppliers frequently invest in monitoring technology, which enables them to monitor water quality and treatment processes and adjust treatment or other operations from a remote location. This type of system (known as Supervisory Control and Data Acquisition, or SCADA) is generally too expensive for small water supply owners. The Sustainable Infrastructure Society has proposed to undertake pilot projects with a new networked monitoring service. This service is intended to keep track of water system parameters (such as pump run times and reservoir levels) at regular intervals and archive the data for later use.

The operator can review data at any time using an Internet browser to identify patterns, analyze trends in the system and detect symptoms of problems at an early stage. Reports are automatically generated, converting operational data into useful information, and are sent by email to designated individuals. This helps improve communication with customers, owners and regulators. Overall, the service

should help maximize the effectiveness of management and operations and is much more affordable than a full SCADA system. For more information, contact The Sustainable Infrastructure Society at www.WaterBC.ca.

Researchers at a national level have also been discussing the potential for “leapfrog” technologies. Essentially, the intent with this initiative is to determine if there are “off-the-shelf” technologies (e.g., I-pads, data loggers) that can be applied to water system monitoring or control, which small system owners could use to improve oversight of their water system without spending large amounts of money.

The Ministry of Community and Rural Development, in partnership with the Ministry of Healthy Living and Sport and the Ministry of Environment, completed the development of a web page dedicated to small community infrastructure. This web page is intended to provide a single point of contact for information related to smaller community and smaller system issues. The page addresses drinking water, wastewater, and stormwater and rainwater management, as well as related subject areas such as groundwater, energy efficiency, and First Nations issues. The web page has a stand-alone URL (<http://bc.smallcommunityinfrastructure.ca>), which is hosted by Waterbucket.ca. It is a “community of interest” on the Waterbucket.ca homepage. The provincial government has committed to develop this website, given the need and desire to help small communities manage and operate their water, wastewater, rainwater and energy infrastructure. The site is designed to be a valuable, user-friendly tool for small system owners, managers and operators.

Training and Information Sessions

Thompson Rivers University

In 2005/2006, Thompson Rivers University’s WaterSafe course went live. WaterSafe is a basic course for owners and operators of small water systems. It provides critical information about water sources, monitoring, treatment, storage and distribution, and information about the responsibilities of small water system owners and operators. Successful completion of the course includes WaterSafe certification and EOCP education credits. Information about this course is available at www.tru.ca/trades/constudies/winter/cs_wt.html.

Small Water Users Association of British Columbia

The Small Water Users Association of British Columbia

supports small water suppliers in the province through educational workshops and newsletters. It has also developed a guide to online resources for small water systems (www.smallwaterusers.com/publications.htm). It works closely with the BCWWA, the Water Supply Association of BC, the Coastal Water Suppliers Association, and the BC Ground Water Association to exchange information and coordinate scheduling for events. In September and October 2008, the association worked with partners to run workshops for small system owners in 108 Mile Ranch, Duncan, Campbell River and Abbotsford.

BC Water & Waste Association

The BC Water & Waste Association regularly offers a “Managing Small Water Systems” course. This is a two-day course eligible for certification credits by the EOCP. The course is suitable for managers, operations staff, trustees, councillors and anyone involved directly or indirectly with water systems. The Managing Small Water Systems course focuses on the basic fundamentals of managing and operating a well-run water system. This includes:

- establishing best practices for managing assets and maintaining a system;
- developing effective communication;
- exploring key planning tools and sustainable operations;
- establishing effective governance and management functions;
- hiring the right staff and consulting with the public;
- identifying the basics of project delivery;
- establishing proper budgeting; and
- understanding legal requirements.

The course is participatory and involves several group exercises.

7.3 Performance Measurement and Reporting

Ombudsman's Report

In the 2008 special report *Fit to Drink: Challenges in Providing Safe Drinking Water in British Columbia* (www.ombudsman.bc.ca/resources-and-publications/reports#Special_Reports), the Ombudsman made many observations about the challenges faced by small water supply systems and the people who rely upon them.

Recommendations related to small systems were directed to health authorities as well as to the provincial government. There were also many general observations and recommendations in the report that are relevant, though not specific to, small water systems.

In particular, the Ombudsman identified training and certification as a challenge faced by small systems, and the large number of unregulated small systems as a priority for the health authorities and the Ministry of Health. Updates on implementation of the report recommendations can be found at www.ombudsman.bc.ca/resources-and-publications/reports#Special_Reports.



Section 8. Full-Cost Accounting

The Action Plan for Safe Drinking Water in British Columbia states that “water should be affordable with users paying appropriate costs.” Full-cost accounting is a process that ensures water suppliers are funding all water system costs through their basic water rates, neither subsidizing water supply system costs through other revenue streams (general tax base), nor deferring costs of future infrastructure or operational needs.

There is a common perception that water should be inexpensive, if not free, but the costs of treatment and distribution infrastructure can be significant. In many cases, water systems have been developed with the up-front infrastructure costs hidden in overall land development costs. Subsequent operation budgets often do not allow for ongoing maintenance and replacement of water supply system components, and as infrastructure ages, large-scale replacement projects become necessary. This is particularly problematic for small systems, where all infrastructure was originally installed at essentially the same time, and components reach their natural life span at the same time. This commonly results in the eventual need for suppliers to have significantly more financial capacity to meet replacement costs than was required to operate a new system. These needs may arise 30 or 40 years after the system was originally

constructed, and many systems are currently facing this challenge. Compounding the real technical challenge of maintaining aging infrastructure is the fact that customers tend to be largely unaware of the true cost of their water infrastructure and may oppose increases to their rates, focusing on the change rather than on the total cost of maintaining and operating the water system they rely on.

Affordable water rates should be structured to cover long-term considerations as well as day-to-day needs. Ideally, reserve funds will be in place to address predictable large-scale replacement projects, such as water main replacements and reservoir repairs. Paying a slightly increased rate in order to build reserve funds is generally more effective than financing a large project through one-time payments or financing debt.

For a water supply system owner to establish appropriate rates, it is necessary to ensure that all of the assets of the system are accounted for, including not only treatment and distribution system components, but also maintenance vehicles, access roads, security systems and buildings.

The assessments conducted by health authorities and water suppliers discussed in Section 4 will help to improve planning for long-term needs, as will a recent change in local

government asset management standards. Similarly, the Sustainable Infrastructure Society has been working on a number of projects to assist small suppliers to undertake an inventory of their infrastructure; map it; determine its age, maintenance and replacement needs; and develop an asset management plan.

8.1 Effective Strategies

As of January 2009, local governments are required to undertake an inventory of all of their assets, including their drinking water infrastructure (when it was installed, its useful life and original cost). This requirement will result in improved assessments of treatment and distribution works and will facilitate planning for future maintenance and replacement schedules. More detail on asset management is provided in Section 8.2.

8.2 Aligned Management Systems

To appropriately manage a water supply system's finances, it is necessary to have a full understanding of the financial needs of the system. Assessments conducted by water suppliers, combined with information from drinking water officer inspections, will help water suppliers identify and prioritize their infrastructure and operational needs, develop budgets and set appropriate rates. Data systems do not currently allow detailed analysis or reporting of progress made by water suppliers to identify and prioritize their financial needs and develop full-cost accounting programs.

Tangible Asset Management

A common challenge faced by water suppliers is aging infrastructure, which requires increasing maintenance costs or needs to be replaced. Increasing maintenance costs can be difficult to budget for from year to year, and replacement of significant infrastructure such as buildings, storage reservoirs or dams can result in large expenditures in any one fiscal year. The shortfall in funds to pay for the replacement of existing assets when they wear out is known as infrastructure deficit. The Federation of Canadian Municipalities has reported on a number of estimates that the total Canadian local government water and wastewater infrastructure deficit is approximately \$90 billion and rising.¹⁵ Whether this figure is an accurate measure of the infrastructure deficit is unclear.

However, it is certain that many communities in British Columbia have unmet infrastructure needs.

To address infrastructure deficit, a significant change in tangible asset management by local governments was brought into effect in January 2009. In Canada, local government accounting rules are determined by the Canadian Institute of Chartered Accountants (CICA). The CICA has established a group of professionals that deals specifically with public sector accounting standards, called the Public Sector Accounting Board (PSAB). PSAB is responsible for setting all accounting rules, which are known as "generally accepted accounting principles" (GAAP). The province requires all local governments in British Columbia to comply with the GAAP set out by PSAB. Section 167(2) of the *Community Charter* states: "The financial statements must be prepared in accordance with generally accepted accounting principles for local governments." The change introduced by CICA in 2009 requires local governments to undertake an inventory of all of their assets, including their drinking water infrastructure (when it was installed, its useful life and original cost).

Small Water System Assistance

As discussed in Section 7.2, a number of projects were underway during the reporting period to assist small water systems. Many of these projects are intended to address the challenges small systems face with respect to their basic capacity to comply with regulatory requirements, when they attempt to improve their system management in order to achieve long-term sustainability of their supply.

Asset Management Planning

Both Asset Management BC and the Sustainable Infrastructure Society, working with industry partners, have been developing a number of tools to assist small water supply system owners to develop an asset management plan. The combination of tools under development, or already completed, will assist suppliers to develop a comprehensive inventory of their system components, to map them, and to evaluate their operation and replacement costs and their expected life span. Once developed, an asset management plan allows system owners to systematically manage assets, and schedule replacement or rehabilitation before it becomes a problem. In turn, the plan enables owners to predict financing needs well into the future, and set water rates accordingly.

¹⁵ The report *"Danger Ahead: The Coming Collapse of Canada's Infrastructure"* is available at www.fcm.ca/CMFiles/mdeficitlope792008-3425.pdf.

Access to Loans

The Sustainable Infrastructure Society has also been working with credit unions to arrange an Access to Loans program for community water suppliers. Details on progress on this loan program initiative are provided in Section 7.2.

Further information on assistance available to suppliers from the Sustainable Infrastructure Society is available at www.WaterBC.ca.



Section 9.

Recommendations

Progress and Gaps

While significant progress has been made to address many of the gaps identified in previous reports on *Progress on the Action Plan for Safe Drinking Water in British Columbia*,¹⁶ much remains to be done. This section provides commentary on actions taken related to recommendations in the 2008 report (progress on the 2007 recommendations was reported on in the 2008 report), and establishes a current context for the recommendation. Updated recommendations for 2011 are also provided.

Lead roles in responding to the recommendations are provided with the understanding that the lead agency may not necessarily be able to address all elements of a given recommendation, but is best positioned to lead joint actions across ministries and agencies.

¹⁶ These reports covered the period of May 2003 to March 31, 2007, and are available at www.health.gov.bc.ca/pbo/reports/drinkingwater.html.

Environmental Farm Planning

Recommendation 1

2008: The federal and provincial governments should continue to fund the Environmental Farm Plan Program. (Leads: Agriculture and Agri-food Canada, Ministry of Agriculture and Lands)

The Environmental Farm Plan Program continues to be funded, and the Ministry of Agriculture and Lands will continue to support the program, subject to available funding.

2011: The federal and provincial governments should continue to fund the Environmental Farm Plan Program. (Leads: Ministry of Agriculture, Agriculture and Agri-food Canada)

Source Water Protection

Recommendation 2

2008: Government should identify priorities for source water protection initiatives and ensure action is coordinated across government agencies and health authorities. (Lead: Ministry of Healthy Living and Sport)

The Ministry of Environment has continued to work actively with the Ministry of Health and regional health authorities to support drinking water officers and source water protection initiatives. Government reorganization in 2008 and again in 2010 has created some uncertainty over the respective roles of staff within the Ministry of Environment, Ministry of Health and Ministry of Forests, Lands and Natural Resource Operations, related to source water protection and standard setting. Clarification of roles and priorities related to source water protection remains a priority, particularly in light of this restructuring. Recently the Ministry of Energy and Mines has created an inter-ministry technical committee focused on water management related to shale gas hydraulic fracturing. The Ministry of Health is an active participant on this committee.

Regional drinking water teams have identified concerns related to timber harvesting, recreational activity, residential development adjacent to drinking water sources, and oil and gas exploration and development as key activities that either threaten drinking water sources, or are perceived to do so by

water suppliers and the public. Oil and gas exploration and development are of particular interest because of the recent advent of shale gas exploration and development.

BC has recently reviewed and upgraded environmental considerations through the new *Oil and Gas Activities Act* which includes updated Drilling and Production Regulations and Environmental Protection and Management Regulations. These regulations have taken into consideration established understandings of the practices associated with shale gas extraction, including hydraulic fracturing. Some strengthened protective measures include barring any hydraulic fractures shallower than 600 meters, prohibiting the contamination of water sources, specifying well casing requirements and granting the Oil and Gas Commission the authority to request and make public the chemical constituents of fracturing fluids. Information on where hydraulic fracturing activities are taking place, and detailed information about the practices and additives used during the activities will be publicly available in January 2012.

2011: Government should clarify the respective source protection roles of the Ministry of Health, Ministry of Environment, Ministry of Energy and Mines, Oil and Gas Commission and Ministry of Forests, Lands and Natural Resource Operations, and should continue to identify priorities for source water protection initiatives, ensuring action is coordinated across government agencies and health authorities. (Leads: Ministry of Health, Ministry of Environment, Ministry of Forests, Lands and Natural Resource Operations, Ministry of Energy and Mines, Oil and Gas Commission)

Groundwater Management

Recommendation 3

2008: Where groundwater use threatens to significantly deplete aquifers, government should initiate water protection planning processes and require groundwater licensing where appropriate. (Lead: Ministry of Environment)

To protect groundwater from depletion, the Ministry of Environment has been undertaking a *Water Act* modernization process which is currently proposing to regulate withdrawals of groundwater above a threshold throughout the province.

It is proposed that the groundwater regulation regime would parallel the regime for surface water and proponents would be required to submit groundwater information. This regulatory system would promote sustainable groundwater use, and prevent conflicts between users. The interaction between surface water and groundwater would be considered in all decisions to protect existing users, stream health and the contribution of groundwater to base flows.

Depletion of groundwater and surface water dependent upon groundwater for recharge remains a concern in several areas of the province, and site-specific restrictions on groundwater withdrawal remains a priority. The recognition of interactions between surface water and ground water in many of BC's alluvial aquifers is a reason why the *Water Act* modernization process is considering a groundwater licensing process integrated into the existing surface water licensing scheme.

The Environmental Management and Protection Regulation under the Oil and Gas Activities Act which was brought into effect on October 4th, 2010 contains provisions intended to protect the sources of domestic water supplies where they are identified in the Integrated Land and Resource Registry or in the Land and Resource Data Warehouse. These provisions are of particular significance in addressing concerns that have been raised about the potential for shale gas activities to impact aquifers that are used as drinking water sources.

2011: Where groundwater use, including use for geothermal energy or oil and gas exploration or production, threatens to contaminate or significantly deplete water supply sources, including drinking water sources, government should;

- a) continue to identify and characterize water resources and ensure they are documented in the Integrated Land and Resource Registry or in the Land and Resource Data Warehouse,
- b) initiate water protection planning processes, and
- c) require groundwater licensing where appropriate.
(Leads: Ministry of Health, Ministry of Environment, Ministry of Energy and Mines, Oil and Gas Commission)

Monitoring Effects of Resource Activity

Recommendation 4

2008: Government should continue to improve monitoring for potential impacts of resource activities on drinking water. Monitoring should either be undertaken by the parties conducting the resource activity or by government.

(Leads: Ministry of Healthy Living and Sport, Assistant Deputy Ministers' Committee on Water)

The Ministry of Forests, Lands and Natural Resource Operations (through the Forest Practices and Investment Branch of the former Ministry of Forests and Range) has made significant progress in developing and implementing tools to assess the impacts of forestry operations on water sources through the Forest and Range Evaluation Program. Under this program, 1,202 locations potentially impacted by forestry activity were evaluated between 2007 and 2009. In addition to providing information to support a general understanding of forest practice impacts on water, the Forest and Range Evaluation Program provides site specific evaluations.

Many studies have been conducted and more are underway to quantify water availability in areas in the northeast which have potential for shale gas production. Ministry of Energy and Mines, Geoscience BC, Ministry of Environment, University of Northern British Columbia and industry have collaborated to improve the understanding of surface water, shallow subsurface water and saline aquifers across northeast British Columbia. Additional programs are in progress to increase baseline data and improve modelling through additional hydrometric stations, climate stations, piezometers and observation wells.

2011: Government should continue to improve monitoring for potential impacts of resource activities on drinking water. Monitoring should either be undertaken by the parties conducting the resource activity or by government, and should focus on parameters specifically associated with each resource activity such as sediment loading from soil.
(Leads: Ministry of Forests, Lands and Natural Resource Operations, Ministry of Health, Ministry of Environment)

Evaluating Land-use Management Practices

Recommendation 5

2008: Government should continue to evaluate the potential impacts of activities on source water quality, including the benefits and weaknesses of different land-use management practices. (Leads: Ministry of Agriculture and Lands, Ministry of Healthy Living and Sport, and research and granting agencies)

Progress made by the Ministry of Forests, Lands and Natural Resource Operations (as discussed under Recommendation 4) has resulted in a significant improvement in the provincial government's ability to evaluate the effectiveness of forestry-related land-use practices in protecting water quality. This evaluation process can be adapted for use in evaluating other land-use practices. The Forest Practices Board has also made progress in undertaking a comprehensive review of cumulative impacts of land use in the Kiskatinaw River Watershed.

As results-based legislation continues to govern resource-based industries operating in consumptive use watersheds and aquifer recharge areas, it is important that resource ministries continue to evaluate the effectiveness of industry practices in managing impacts to drinking water sources.

2011: Government should continue to evaluate the potential impacts of activities on source water quality, including the benefits and weaknesses of different land-use management practices, and should promote those practices that minimize water quality impacts. (Leads: Ministry of Forests, Lands and Natural Resource Operations, Ministry of Agriculture, Ministry of Health, Ministry of Environment, Ministry of Energy and Mines, Oil and Gas Commission and research and granting agencies)

Water Protection Planning

Recommendation 6

2008: Government should complete the process for developing drinking water protection plans. The process developed should complement planning under the Water Act. Where source water assessments show drinking water sources are at risk from land use, or where source contamination has led to water quality advisories or identified outbreaks,

drinking water protection plans should be developed.

(Leads: Ministry of Healthy Living and Sport and Ministry of Environment, and Ministry of Community Development)

The general process for initiating and developing plans has happened largely through the development of a Water Management Plan for the Township of Langley under the *Water Act* and consideration of a planning process for the Comox Valley Regional District. The Water Management Plan for the Township of Langley has been completed and submitted to the provincial government, but has not been approved by the Lieutenant Governor in Council in order to bring it into effect under the *Water Act*.

The Provincial Health Officer has recommended that the Minister of Health order a planning process under the *Drinking Water Protection Act* for the Comox Valley Regional District. To date no such order has been issued, pending further discussions between the Ministry of Health and the Comox Valley Regional District. In the interim, the Comox Valley Regional District has been undertaking assessment work, with funding from the Public Health Agency of Canada, to further refine the needs of any future planning under the *Drinking Water Protection Act*.

The drinking water protection planning processes established under the *Drinking Water Protection Act* are intended to only be initiated under unusual circumstances where all other means of addressing drinking water health hazards have failed. This part of the Act is not intended as a mechanism for routine planning by all water supply systems. The *Drinking Water Protection Act* enables implementation of planning undertaken by direction of a Ministerial Order through regulations made under the Act, but does not clearly contemplate implementing plans developed in the absence of such a ministerial order.

2011: To ensure that any planning efforts undertaken by a water supplier, including planning undertaken outside the scope of the *Drinking Water Protection Act*, can be implemented under the *Drinking Water Protection Act*, government should consider amending the Act to clearly enable elements of water suppliers' plans to be implemented through provincial regulation made pursuant to the *Drinking Water Protection Act*. (Lead: Ministry of Health)

Information Management

Recommendation 7

2008: An Environmental Health/Health Protection Application should be completed by December 2009. A system to allow government staff, health authority staff, water suppliers and their agents, and the general public to access all data relevant to drinking water systems or drinking water protection, which is not subject to protection of privacy requirements, should be developed by December 2010. (Lead: Ministry of Health)

The provincial government, health authorities and water suppliers continue to be challenged by their inability to readily access data about water supplies that could improve land-use decisions and access information about land uses that could help water suppliers and drinking water officers manage risks to source water. Data continue to be maintained in multiple data management systems and linkages between these systems is incomplete.

Initiatives to date have failed to deliver a province-wide information management system that satisfies the public health needs identified in previous recommendations, and the development of improved information management applications remains a priority.

2011: In the absence of a province-wide drinking water information management system, regional applications should be improved to allow standardized reporting across the province. At a provincial level applications should be enhanced to allow government staff, health authority staff, water suppliers and their agents, and the general public to access all provincial government and health authority data relevant to drinking water systems or drinking water protection, where that data is not subject to protection of privacy requirements. (Lead: Ministry of Health, Ministry of Labour, Citizens' Services and Open Government, health authorities)

Cross-Government Referral Protocols

Recommendation 8

2008: Regional drinking water teams established under the Memorandum of Understanding for Inter-Agency Accountability and Coordination on Drinking Water Protection should develop protocols to ensure decisions that affect the safety of drinking water involve the appropriate health officials, either within the Ministry of Healthy Living and Sport or within the regional health authority. (Leads: Ministry of Healthy Living and Sport and Regional drinking water teams)

Under the Memorandum of Understanding on Inter-Agency Accountability and Coordination on Drinking Water Protection, regional drinking water teams with representatives from health authorities and resource ministries have been established and have drafted referral protocols. These referral protocols have not been completed in final detail and in some cases the fundamental principles in the referral processes may not have been communicated to all decision makers within a region. Drinking water officers continue to be made aware of some controversial land-use decisions through complaints received from the public rather than from other decision makers early in the approval process. It remains important for decision makers to consider potential impacts on drinking water sources from activities they approve, and regional teams should continue to refine and implement referral processes.

2011: Regional drinking water teams established under the Memorandum of Understanding for Inter-Agency Accountability and Coordination on Drinking Water Protection should continue to evaluate and improve protocols to ensure decisions that affect the safety of drinking water involve the appropriate health officials, either within the Ministry of Health or within the regional health authority. (Leads: Regional drinking water teams, Directors' Inter-Agency Committee on Drinking Water)

Recommendation 9

2008: Ongoing commitment to integrating government activities should remain a priority of the Assistant Deputy Ministers' Committee on Water. The need for cooperation across agencies should be communicated by member Assistant Deputy Ministers to other Assistant Deputy Ministers within their ministry and to field staff.
(Lead: Assistant Deputy Ministers' Committee on Water)

The Assistant Deputy Ministers' Committee on Water was dissolved in 2009. Government is currently considering options for Assistant Deputy Minister level coordination bodies that could have a role in cross government co-ordination of drinking water related concerns. The Directors' Inter-Agency Committee on Drinking Water met at a reduced frequency during 2008 and 2009 and has recently undergone some changes in membership reflecting restructuring of ministries. The restructuring of ministries has also resulted in significant changes in accountability for resource management, through amalgamation of many decision-making roles into the new Ministry of Forests, Lands and Natural Resource Operations, and establishment of a regionalized service delivery model.

The current legislative framework in British Columbia has moved away from mandatory regulatory referral processes between Ministries in favour of non-legislated referral processes. The commitment toward coordination across government has been stated in the cabinet approved Action Plan for Safe Drinking Water in British Columbia principle that "Providing safe drinking water requires an integrated approach" and in the establishment of regional drinking water teams. It remains a priority to ensure that decision makers are aware of any potential impacts that their decisions may have on a drinking water supply and their over-arching responsibility to ensure that the protection of drinking water is considered in their decisions.

2011: The Directors' Inter-Agency Committee on Drinking Water should take steps to ensure that regional decision makers with all resource ministries are aware of the cabinet approved Action Plan for Safe Drinking Water In BC commitment to an integrated approach to providing safe drinking water.
(Lead: Ministry of Health)

Consistent Policy across Government

Recommendation 10

2008: The Directors' Inter-Agency Committee on Drinking Water should develop protocols to ensure all government policy decisions related to land use or water management that could have an impact on the province's drinking water program will be taken to the Assistant Deputy Ministers' Committee on Water to ensure that policy direction is consistent with the Action Plan for Safe Drinking Water in British Columbia. The work of the Assistant Deputy Ministers' Committee on Water and the Directors Inter-Agency Committee on Drinking Water should be made more transparent; minutes of their decisions should be made publicly available by December 2008. (Leads: Ministry of Environment, Ministry of Healthy Living and Sport)

The Assistant Deputy Ministers' Committee on Water was dissolved in 2009 and its responsibilities were transferred to the Assistant Deputy Ministers' Committee on Integrated Land Management (ADMCLM), which was subsequently dissolved following restructuring of government Ministries in 2011. Government is currently considering options for Assistant Deputy Minister level coordination bodies that could have a role in cross government co-ordination of drinking water related concerns.

To date minutes of the Directors Inter-Agency Committee on Drinking Water are not being made posted on the internet, however the chair of the committee provides information to the Provincial health officer on activities and outcomes of the committee and this information is included in Progress on the Action Plan for Safe Drinking Water in BC reports.

Government has continued to make high level policy commitments to water quality with resource ministry service plans incorporating governments' goal to "Lead the world in sustainable environmental management, with the best air and water quality, and the best fisheries management, bar none." Currently there is a gap in executive government coordination of activities related to drinking water and drinking water source protection.

2011: Government needs to ensure that mechanisms are in place to ensure that policy direction across government is consistent with government's eight principles outlined in the Action Plan for Safe Drinking Water in British Columbia. (Lead: Ministry of Health)

Water System Assessments

Recommendation 11

2008: All water suppliers need to undertake thorough assessments of their systems and develop assessment response plans. Health authorities need to ensure that all water suppliers have established time frames to complete the assessments. In evaluating assessment response plans, health authorities should require water suppliers relying on surface water sources to plan for treatment capable of achieving 99.99 per cent reduction in virus levels, 99.9 per cent reduction in protozoa levels, and turbidity levels below 1 NTU, through treatment processes involving at least two barriers, unless there is good justification, acceptable to the drinking water officer, for not achieving those levels. Health authorities should also ensure that all small water supply systems understand the sampling frequency requirements. Where appropriate, sampling frequencies should be included on operating permits. Efforts should be made by stakeholders to reduce the number of systems on long-term boil water advisories, while ensuring the health of the community through improvements in water quality delivered to citizens. (Leads: Health authorities, drinking water suppliers, local authorities)

While progress has been made to assess all water systems in the province, the large number of systems and their resource limitations continue to make it difficult to assess all systems and to update assessments as improvements are made, as changes occur within watersheds or groundwater recharge areas for wells, as infrastructure deteriorates, and as operational conditions change.

The continuing absence of a comprehensive database for recording the results of assessments remains a significant concern. Some data have been entered into existing health authority or water supplier data systems as well as the Ministry of Environment's Ecological Reports Catalogue, EcoCat (<http://a100.gov.bc.ca/pub/acat/public/welcome.do>); however, additional data exist in paper-based reports. Data about the location of potential sources of contamination for water sources exist in databases maintained by several government ministries, but they are still not readily accessible to water suppliers or drinking water officers in an electronic format clearly linked to the assessment process.

The need for many water suppliers to undertake assessments of their systems remains a significant priority, as does the development of an information management system to track and record the results of assessments.

2011: All water suppliers need to undertake thorough assessments of their systems and develop assessment response plans. Health authorities need to ensure that all water suppliers have established time frames to complete the assessments. In evaluating assessment response plans, health authorities should require water suppliers relying on surface water sources to plan for treatment capable of achieving 99.99 per cent reduction in virus levels, 99.9 per cent reduction in protozoa levels, and turbidity levels below 1 NTU, through treatment processes involving at least two barriers, unless there is good justification, acceptable to the drinking water officer, for not achieving those levels. Health authorities should also ensure that all small water supply systems understand the sampling frequency requirements. Where appropriate, sampling frequencies should be included on operating permits. Efforts should be made by stakeholders to reduce the number of systems on long-term boil water advisories, while ensuring the health of the community through improvements in water quality delivered to citizens. (Leads: Health authorities, drinking water suppliers, local authorities)

Small Water System Financing

Recommendation 12

2008: Government should improve access to funding support for public water supply systems that are currently ineligible for federal/provincial infrastructure assistance, where there is a long-term strategy in place to ensure continuing viability of the system. The provincial government should ask the federal government to establish an equitable framework for accessing federal assistance for water supplies not recognized by current federal government funding programs, to facilitate conversion of ownership to local governments. (Lead: Ministry of Community Development)

The vision of the Ministry of Community, Sport and Cultural Development continues to encourage the conversion of

improvement districts to regional district service areas and municipal jurisdictions. Consistent with that direction, it is important to maintain the existing financial incentives for conversion. Moreover, the ministry does not support providing funding assistance to water system owners who are not fiscally accountable to the provincial government. The ministry will continue to restrict Water Infrastructure Grants to regional districts and municipalities. At the same time, the ministry continues to encourage local governments to work with small water supply system owners and to make application for capital infrastructure grants to rehabilitate water systems on the assumption that the ownership of the system would shift to the regional district. The ministry also encourages small water supply systems to access Infrastructure Planning Grants to assist regional districts and water system owners in analysing water system needs. This is as a precursor to local government assuming responsibility and upgrading those systems, possibly with provincial Water and Sewer Infrastructure Grants. This has been a consistent policy for 25 years.

The lack of adequate infrastructure, particularly drinking water treatment systems in smaller communities that rely on surface water sources, remains a major gap. Protocols do exist to allow transfer of water systems to local government as local service areas, with full access to infrastructure grants.

2011: Government should work with small water supply system owners to access financial resources through transfer of ownership to local government, and should consider the development of loan or grant programs for small systems with an associated fiscal accountability framework. (Lead: Ministry of Community, Sport and Cultural Development, Ministry of Health)

Water System Performance Monitoring

Recommendation 13

2008: Based on the needs identified by assessments and the requirements stipulated on operating permits, water suppliers should implement or expand treatment performance monitoring to include variables such as CT, filtration performance, turbidity, UV performance, pH, and pressure regimes as appropriate. (Leads: Water suppliers, drinking water officers)

All of the health authorities agree that this type of monitoring is worthwhile and have been developing procedures to establish requirements for suppliers to develop such monitoring programs. Many suppliers, particularly larger ones, have been required to establish performance monitoring programs or have done so on their own initiative.

2011: Based on the needs identified by assessments and the requirements stipulated on operating permits, most water suppliers should implement or expand treatment performance monitoring to include variables such as CT, filtration performance, turbidity, UV performance, pH, and pressure regimes as appropriate. (Leads: Water suppliers, drinking water officers)

Water Testing

Recommendation 14

2008: To ensure all public water supply systems have improved access to laboratory testing of water samples, a broader network of approved laboratories should be encouraged. The use of on-site test kits to augment testing at remote locations should be promoted. (Leads: BC Centre for Disease Control, Enhanced Water Quality Assurance Steering Committee, Ministry of Healthy Living and Sport)

Some challenges in accessing laboratories remain in some regions of the province. Progress has been made to improve transportation efficiency resulting in a decrease in the number of samples too long in transit to analyse. More of the province has improved access to approved laboratories than in previous years, however, the ability to access laboratories in a timely manner remains a challenge for many areas in the north, interior and central coast.

2011: To ensure all public water supply systems have improved access to laboratory testing of water samples, a broader network of approved laboratories should be encouraged. The use of on-site test kits as a quality assurance tool to augment testing at approved laboratories should be promoted. (Leads: BC Centre for Disease Control, Ministry of Health, health authorities)

Inventory and Assessment of Small Water Systems

Recommendation 15

2008: Health authorities and the provincial government should develop an accurate inventory of BC's small public drinking water supply systems and obtain all of the data identified as part of the drinking water information management project core data set. (Leads: Health authorities, Ministry of Healthy Living and Sport)

All of the health authorities and the Ministry of Health agree that an accurate inventory of small water supply systems would be beneficial. As of March 31, 2009, 3,396 of the 4,325 water supply systems in the province that serve 300 or fewer connections had been inspected to the extent that a hazard rating could be assigned. Core data has been collected for the majority of systems in Vancouver Island, the North, Fraser and Vancouver Coastal Health Authorities. Some data has been collected on all known systems in the Interior, but the focus for data collection there (including updating older data) has been on those systems that pose the greatest risk and data collection has been undertaken as part of a boil water remediation process. It is generally acknowledged by drinking water program staff in the health authorities that a large number of small systems continue to exist without regulatory oversight. There are practical limitations to identifying and collecting information about very small systems, especially in remote areas. Limitations include the lack of a disclosure mechanism for water suppliers, a lack of in-house capacity to search for such systems, and capacity challenges of health authorities and the small system owners to undertake the assessments needed to generate the requisite data.

2011: Health authorities and the provincial government should continue to develop an accurate inventory of BC's small water supply systems and obtain all of the data that was identified as part of the drinking water information management project core data set. (Leads: Health authorities, Ministry of Health)

Small Water System Amalgamation

Recommendation 16

2008: Government should pursue legislative change to allow decision makers with the Ministries of Transportation and Environment, health authorities, and local governments to:

- a) Prohibit the creation of multiple small water supply systems where one larger system could be developed.*
- b) Facilitate extensions of local government boundaries to allow expansion of local government-owned water supply systems.*
- c) Provide authority to require developers to connect new properties with existing adjacent water supply systems.*

Local governments should be required to address the issues of non-viable small water supply systems in growth management strategies. (Leads: Ministry of Community Development, Assistant Deputy Ministers' Committee on Water)

No clear legal authority exists to readily allow the province to prohibit the proliferation of small private systems during the subdivision process, nor to force existing systems to amalgamate or transfer ownership to local government. Where a proposed water supply system meets regulatory requirements, even though it is likely that it will ultimately lack the capacity to be sustainable into the future, it is generally not legally possible to deny the application even if preferable options exist. Financial incentives do exist to encourage small system owners and users to transfer ownership to local governments, and several regional districts have well-developed programs to acquire small water systems. A working group of the Directors' Inter-Agency Committee on Drinking Water has been developing a strategy to address this recommendation in the context of a larger mandate to address issues related to small drinking water systems and the group expects to have recommendations for government to consider in 2012.

2011: Government should pursue legislative change to allow decision makers with the Ministry of Transportation and Infrastructure, Ministry of Forests, Lands and Natural Resource Operations, health authorities, and local governments to:

- a) Prohibit the creation of multiple small water supply systems where one larger system could be developed.**
- b) Facilitate extensions of local government boundaries to allow expansion of local government-owned water supply systems.**
- c) Provide authority to require developers to connect new properties with existing adjacent water supply systems.**

All local governments should be required to address the issues of non-viable small water supply systems in growth management strategies.
(Leads: Ministry of Community, Sport and Cultural Development, Ministry of Health)

Full Cost Accounting

Recommendation 17

2008: Government should continue to develop assistance for small water supply systems to help them plan for ongoing maintenance and system upgrades. Suppliers should be required to proceed with upgrades through conditions on their operating permits. (Leads: Ministry of Healthy Living and Sport, Ministry of Community Development, health authorities)

Progress has been made on the development of tools to assist small water supply system owners to plan for ongoing maintenance and system upgrades. The Sustainable Infrastructure Society, through funding assistance from the Ministry of Health, has been developing a number of programs to assist system inventory and mapping and fiscal planning for small water supply systems. Completion and implementation of these tools remains a priority.

2011: Government should continue to develop assistance for small water supply systems to help them plan for ongoing maintenance and system upgrades. Suppliers should be required to proceed with upgrades through conditions on their operating permits.
(Leads: Ministry of Health, Ministry of Community, Sport and Cultural Development, health authorities)

Water Rates

Recommendation 18

2008: Rates for drinking water should reflect the true, long-term costs of water treatment, distribution and water system operation, maintenance, and monitoring. Revenue generated from charges for water should be re-invested in programs that promote awareness of water quality and quantity, protect water quality, improve public health, and encourage sustainable water use to promote healthy communities. (Lead: Ministry of Community Development)

Municipal governments are now required to undertake an inventory of all of their assets, including their drinking water infrastructure (when it was installed, its useful life and original cost). This requirement will result in improved assessment of treatment and distribution works and facilitate planning for future maintenance and replacement schedules. While this will be applicable to the majority of the BC population, most water supply systems are not owned by local government and are not subject to this requirement. No substantial progress has been made by government to ensure that water suppliers not owned by local government are moving toward sustainable funding of their operations and infrastructure requirements.

2011: Rates for drinking water should reflect the true, long-term costs of water treatment, distribution and water system operation, maintenance, and monitoring.
Revenue generated from charges for water should be re-invested in programs that promote awareness of water quality and quantity, protect water quality, improve public health, and encourage sustainable water use to promote healthy communities.
(Leads: Ministry of Community, Sport and Cultural Development, Ministry of Health)



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